JPRS 75539
22 April 1980

West Europe Report

SCIENCE AND TECHNOLOGY

No. 19

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WEST EUROPE REPORT

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EUROPEAN ECONOMIC COMMUNITY ENERGY R & D EFFORTS

Paris L'INDUSTRIE DU PETROL GAZ-CHIMIE in French Dec 79
pp 40-43

/Article by Eric Meyer: Research and Energy Development: Europe's Share/

/Text/ At a time when oil prices are undergoing sporadic price rises that even OPEC itself has given up controlling, the search for new energy sources and exploitation methods naturally takes on a very topical color. A considerable effort is being devoted in Europe, in North America and in Japan to experiments in the fields of nuclear energy, fusion, "natural" energies and energy savings.

Concurrently with these national efforts the EEC has, as such, developed its own research effort which is comparable in the energy sector with that of its main member states.

The purpose of this article is to present the route taken by this community research, its statutes and its methods which make it an original entity that complements the national research and development (R & D) programs. The survey will be based especially on the political and economic choices which have given its present shape to this energy research.

European research is carried out within the framework of a series of specialized four-year programs. 1980 will see the setting up of a new program. This gives us the opportunity to draw up a balance sheet and to compare the orientations chosen in both plans.

In 1977 the Nine spent 1.4 billion UC [unit of account] (one UC is equivalent to Fr 5.85) for energy research and development or 10.7 percent of their total R & D budget. In the same time, the USA spent the equivalent of 1.9 billion UC. In Europe itself the total volume of R & D varies considerably from one country to another; the FRG proves to be the leader with it alone performing 37 percent of the research done in the EEC. France follows with 22 percent and Great Britain does 19 percent.., Thus these three countries provide 80 percent of European R & D.

Out of this budget, each country allots a very variable share to energy: in 1977, it ranged between 18 percent for Italy and less than 1 percent for Ireland; France's share is about 8 percent.

These comparisons of structures must be approached carefully for they only apply to budgetary appropriations, while some countries' R & D is often conducted jointly by public enterprises, whose share does not appear in the statistics--this is especially true in France.

Development of R & D Credits--Energy in the Europe of the Nine and in the United States from 1975 to 1977 (in percent)

	Europe	USA
1975	+ 5%	+ 70%
1976	+ 6%	+ 20%
1977	+ 1%	+ 60%
Average:	+ 6%	x 3

Consequently American research has tripled in 3 years while Europe's has grown at a much slower rate. But, it is only making up for lost time, since it amounted to 600 million UC in 1974, compared with 1.1 billion UC for the community. However, during the petroleum crisis, the EEC member states only managed to increase their research credits 4 percent per year: a rate which disturbs the research departments in Brussels.

The research budget of the Nine is perhaps scanty with respect to needs, but it is enormous, if you compare it with the community program: in 1978 the latter amounted to 255 million UC or 1.7 percent of the Nine's budget, 4 percent of the FRG R & D credits or moreover, the equivalent of the corresponding Danish budget. However, the rate of growth of this community research is double that of the member states and reaches 7 percent per year.

On the other hand, community R & D has a much different structure than that of each member state: 65 percent of its credits are earmarked for the energy sector, which gives it, in spite of its total small budget, a comparable level in this field to that of the large member states. It should be added that nuclear energy absorbs a large part of these credits. A few weeks ago the European commissioner for energy and research, Guido Brunner, announced his intention to ask the Nine to double R & D credits, which would rise in the next 4 years to 1.854 billion UC, of which almost half (881.6 million) would be devoted to nuclear safety.

R & D Credits in Member States and in the EEC as Such

	(in 1,000 UC) Total R & D	(in 1978) Energy R & D	Percent
FRG	5,876	742	13.6
France	3,876	306	7.9
Italy	772	138	17.2
The Netherlands	1,024	42	4.1
Belgium	543	92	16.9
UK	2,487	201	8.1
Ireland	42	0	1.4
Denmark	244	16	6.8
The Nine	14,451	1,540	10.7
EEC (own research)	255	166	65

History of R & D: A Difficult Growth

This orientation of community R & D towards nuclear energy goes back to the founding of the three European communities. In 1958, the Euratom Agreement provided for broad scientific and technological cooperation between member states in this field, as well as the starting of a CCR [Joint Research Center], which was fairly well endowed financially.

Behind these decisions, there was the demand of France, which wanted to improve nuclear technology which could be applied industrially and which had decided to shift part of this effort onto the community.

The CCR was to expand and operate on this basis until 1968. Then a crisis occurred which paralyzed it for 5 years. What happened? The scientists in the CCR had meanwhile begun to study an original operation, called "Orgel", in which the reactor with natural uranium was moderated with heavy water and cooled by organic liquid. In time, this research would have led to a workable nuclear technology, which would be available to all the member states.

But in the same time France and Germany had completed research, trained a generation of technicians and created the basis for a nuclear industry. The crisis then arose from the decision of the big powers to obstruct the development of the CCR and seek cooperation with the United States in the framework of the light water operation. This political choice had two purposes: it prevented the small countries from becoming producers of nuclear plants and it formed with the United States the most impressive concentration of scientific and technical potentials in the world, for the benefit of the two parties.

The results for Europe were not long in coming: The small countries accused France and Germany of deceiving them by having them finance a center which was only to serve the interests of the latter. The "big countries" denied the CCR the right to compete with them. Thus, until 1973, the budgets of the center were cut, adopted late and its staff declined from 2,700 to 2,000. When it came out of the crisis, the CCR was completely demoralized and disorganized and its scientific effectiveness accordingly reduced.

In 1973, the dialogue between the countries, where no one wanted to compromise, disappeared: The "big countries" had then set up their programs for the production and export of nuclear materials.

On 14 January 1974, the Nine decided to develop a joint science and technology policy. Two new principles then saw the light:

Diversification of research: while maintaining the priority of the atom, the systematic study of new energies, the environment and teledetection was begun or reinforced;

The inauguration of a new "indirect" R & D effort, in the form of financial participation in noncommunity, public or private research projects. This indirect research now absorbs today some 50 percent of community R & D efforts.

The Joint Research Center

In 1979, the effects of the crisis were overcome and the CCR again became a well known organization on a world scale because of the quality of its discoveries (it distinguished itself last year with a "first" in the continuous production of hydrogen by the thermochemical cycle). It now has a staff of 2,200,* of whom half are research workers distributed among four establishments located in Ispra (Italy), Petten (the Netherlands), Geel (Belgium) and Karlsruhe (FRG).

Its mandate has hardly changed since its foundation. It carries out assignments of "joint" interest, that is useful to all EEC countries: improving the safety of conventional reactors, breeder reactors (in which besides France, the FRG and the UK are also interested), remote measurement of heat and radioactivity within the plant...in short, about half of the CCR efforts are devoted to the atom. Moreover, the ministers of research who had to adopt the R & D budget for 1980-83 were divided on this subject and this decision was deferred until December 1979. The other fields of energy still receive 20 percent of CCR credits. The center has just acquired a new ESTI [expansion unknown] installation to test equipment, which it is intended to market.

The CCR is also involved in the sector of thermonuclear fusion by magnetic confinement. In this respect, we believe we know from a reliable source that two countries, France and England denied the CCR the right to study fusion by inertial confinement, that is by laser beam. This fusion technique is applied in the military field in the two countries (the only two nuclear powers in Europe) who probably have no desire to see their partners master the "H" bomb and a potential of fundamental knowledge liable to lead them to a new technique of energy production.

In spite of this veto, it is strange that the EEC has managed to coordinate its own research and that of the member states in this sector alone (as well as that of Switzerland and Sweden) in an integrated program of research on fusion in order to reach the operational stage more quickly.

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*This personnel must not be compared with those before the crisis: part of the workers have meanwhile been separated from the CCR to administer programs of indirect activity.

Mr. Brunner proposed an expanding CCR budget to the Nine: the 1977-80 program had 349 million UC, that of 1980-83 should be allotted 542 million UC.

Indirect Research: An Enthusiastic Welcome

The technique of "indirect" activities has been warmly received by private or public, university or industrial research centers and is developing rapidly. It has made it possible to finance, for an average of 25 to 50 percent, many hundreds of projects in the nuclear and new energy fields (see following table).

Programs or Indirect R & D
Energy Activities (in million UC)

Type of Energy	1976-79 Program	1980-83 Program
Solar	17.5	46
Geothermal	13	18
Hydrogen	13	8
Energy conservation	11	27
Systems analysis	4	6
Total new energies	59	105
Plutonium	4.5	20
Waste storage	19.6	53.5
Safety of light water reactors	0	6.3
Declassification of plants	0	4.7
Regulations and standards for fast reactors	0	5.8
Fusion (+ JET)	124	355
Total nuclear energy	148	447.5

In the opinion of the European Commission, the indirect R & D effort should be doubled for new energy and tripled for nuclear energy. Among the new energies, "solar" is receiving favored treatment (its budget tripled). The considerable budget assigned to the JET project is explained by the international scope of this program (which Europe finances up to 80 percent) and by the decision to advance a year the construction of this installation at Culham (Great Britain).

Nuclear energy receives absolute priority: it is interesting to compare these appropriations with the Three Mile Island

incident: preceding the drawing up of this budget by several weeks, it crystallized the antinuclear tendencies in all the member states: Commissioner Brunner often asserted that the EEC, in order to get its nuclear policy accepted, should carry out a dual effort of propaganda with public opinion and of research in the field of plant safety.

Financial participation and legal status are not the only original features of this indirect R & D. Its spirit is also different: Its objective is, of course, to solve theoretical and practical problems involving energy, but also--and for some perhaps more--to provide access to teams of research experts, to "clubs" or forums for the exchange of information. The EEC actually organizes regular meetings between scientists interested in projects of the same type, in the form of committees of 20 persons or of seminars with 700 participants, such as the one which was held in October 1979 on new methods of energy conservation.

Uncertainties

Some of them have appeared during the preceding developments, such as distrust of countries regarding community research--when the latter did not favor, even inconvenienced their sectional interests. This lack of understanding was aggravated by the crisis: A high European official confided to us his exasperation at seeing the ministers "haggle over a few million UC" during the discussion of the research budget, when the dramatic end of the postpetroleum era is taking shape.

There is something more serious: The new European Parliament is being developed and organized. In general, it claims and "is nibbling away" at budgetary powers, that is to say, part of the executive power held by the Council of Ministers. In the field of energy, voices criticizing the nuclear option of the commission and the council are becoming more numerous. That could lead the parliament to question this choice--by blocking their credits, for example. Everything will depend on the importance which it will give this problem and the means of pressure which it will have acquired.

Indirect R & D has another defect: its legal basis. The three agreements--Euratom, ECSC /European Coal and Steel Community/ and EEC control research and have different budgets for it, each for a particular branch; for example, in the coal sector, the commission decides unilaterally the credits to be granted, while the other budgets must be approved by the council.

Because of this fact, there is no R & D budget, but a series of compartmentalized allocations and financial reports from one sector to the other are almost impossible. This leads to great inflexibility in the management of this indirect R & D.

In the same order of ideas, it must be added that "energy research" is subordinate to four general directorates of the commission (general directorates of energy, science and education, industry and social affairs) each fairly jealous of its prerogatives and to a multiplicity of committees or consultative subcommittees intended to coordinate these programs, but which accordingly clog the chain of command. For these reasons, the departments which administer the community R & D are working today at their maximum capacity. If the council would double or increase tenfold research credits tomorrow, the commission would probably be unable to administer them, without previously revamping its organization and consequently the agreements, at least as regards research.

A large part of the community's R & D problems are of a general nature and not sectional: The national reactions, the influence of the agreements reflect more the crisis of the growth of Europe rather than that of research. This can be explained by the fact that in Brussels, as elsewhere, research is guided by political and economic pressures and not by the research workers themselves. It is precisely on this point that its future will depend: The most European are probably going to try, in order to give themselves legitimacy, to exercise an increasing influence in this sector; in the long run this development could lead to a change in the community's energy priorities. Something else is certain: community research is now undergoing a profound upheaval, perhaps still poorly perceived--even by specialists--but quite real. It should give it a few years from now a very different image than today's; we offer as proof of it its rapid budgetary growth (perhaps favored by the relative immobility of the national R & D programs) which counteracts the sluggishness of its management: The result of the almost labyrinthine complexity of the Brussels administration.

8490
CSO: 3102

HIGHER EEC GNP PROPORTION FOR ENERGY INVESTMENTS NEEDED

Dusseldorf BWK: BRENNSTOFF-WAERME-KRAFT in German Jan 80 p 1

[Article: "Higher GNP Proportion Needed for Energy Investments"]

[Text] About 500 times 10^9 dollars is what the European Community has to come up with in the next 10 years in order for its economies to pay for the necessary energy investments to save more energy and to explore alternative sources according to the calculations of the EEC Commission. Presently, investments for energy comprise 20 to 25 percent of the total industrial investment outlay; this corresponds to a proportion of about 2 percent, to the gross national product of the EEC countries. If a policy of "away from oil" is supposed to be successful, however, around the world four to six times as much has to be channeled from the gross national product. This would mean that a notable proportion of the national income would have to be used for energy investments and not for consumption.

9527
CSO: 3102

SECOND IN SITU GASIFICATION EXPERIMENT PLANNED

Paris INDUSTRIES ET TECHNIQUES in French 31 Jan 80 p 11

[Text] The Institute for Development of Underground Gasification will construct an experimental station to show the feasibility of underground coal gasification at great depths. The station will be located at Hensies near Mons.

The Liege division of the Coppee-Rust engineering company has been chosen to conduct the study and supervise construction of the surface installations necessary to carry out the experiment.

Gasification will be obtained by an air-steam or oxygen-steam mixture, at constant and variable high pressure, in order to produce a synthetic or combustion gas.

The experimental station, representing an investment of nearly 200 million FB francs, will get under way at then end of 1981. Experimental results will be used by the institute for future use on a commercial scale.

This project follows an intergovernmental agreement between Belgium and FRG, and costs will be shared by these two governments. The project will receive partial financing from the EEC.

It should be pointed out that another in-situ gasification experiment, also assisted by the EEC, is presently being carried out in the Nord-Pas-de-Calais Basin coal beds.

11,023
CSO: 3102

FRG, JAPAN: EXPERIMENTS WITH MAGNETIC LEVITATION

Paris INDUSTRIES & TECHNIQUES in French 20 Feb 80 pp 30-34

[Article by Jean-Louis Toumit: "Magnetic Slides: High Speed Without Friction"]

[Text] To eliminate friction between wheel and rail, Engineer Bertin perfected the aircushion technique. The Germans and Japanese have chosen another solution: magnetic levitation. This solution is all the more interesting as it is combined with linear propulsion.

The Transrapid against the HSST (High Speed Surface Transport): after shelving -- for technical and later political reasons -- of the French aircushion Aerotrain, the Germans and Japanese are now alone in the race for wheel-less high-speed transportation.

A common element between the Japanese HSST and the Transrapid from beyond the Rhine is magnetic levitation with linear propulsion. The Japanese are placing as outsiders, because Japan Airlines have taken charge of the train, thus benefiting from West German research in the field of electromagnetic levitation. In 1971, MBB (Messerschmitt-Bolkow-Blohm) built the first magnetic-levitation vehicle; other experimental models came into being in the following years. Developed by Krauss Maffei (Transrapid 02), AEG, Siemens, BBC (ETT 01), Thyssen, and Henschel (HBM 2), they have had different means of levitation and propulsion systems.

Let us first review the type of magnetic levitation which depends on permanent mutually repelling magnets. For the time being, the exploitation of this process is severely limited by the need for a guidance system, by the absence of suspension, and by the cost of materials.

The second system under consideration was used on the EET 01. It is an electrodynamic repulsion support model, relying on the following principle: when a coil carrying a constant current moves above an aluminum or copper conducting plate, currents are induced which create repelling reaction forces between coil and conductor. Thus, as soon as the vehicle moves,

it sets off Foucault currents in the rails which tend to reduce lift, and repelling forces which enable the vehicle to "fly" at a height of 10 cm. However, since lift is zero at zero speed, the vehicle must be equipped with takeoff and landing bogies.

This is only one of the system's drawbacks. An even more serious one is the difficult fabrication of the coils. Specialists at the Institute for Transportation Research point out that in order to bear the weight of the car, "you need superconductive coils capable of carrying hundreds of thousands of ampere turns." The conductors are encased in cryogenic containers but the coils must be reactivated and cryogenic losses must be constantly compensated by recycling the cooling liquid (liquid helium). This is why the fabrication of the housings is very difficult: they must not only maintain the coil in a superconductive state, but must also transmit power to the vehicle chassis.

The last but not the least of problems is the need to install magnetic shields to protect against a very intense magnetic field.

Taking these handicaps into account, research turned to a third type of lift, which can be termed attracting-electromagnetic. Attraction forces occur between the metal rails and the electromagnets arranged in strips along each side and at the bottom of the vehicle. In this case, the main problem is the magnitude of the air gap. If it drops, the lift force increases until it fastens the machine to the rails; if it increases, the lift force decreases and the vehicle drops. Thus, with a constant current in the coils, there is only one air gap value for which the magnetic force and the vehicle weight are balanced. A control and adjustment system makes it possible to maintain a small and constant air gap (about 1 cm). The guidance of the device is simplified to the extent that a lateral movement introduces realignment forces on the horizontal plane; but electromagnets have been placed at the sides to ensure better guidance.

It should also be noted that Foucault currents disturb the system's operation as in electrodynamic levitation. These induced currents reduce the vehicle's lift and produce electromagnetic drag. They can be minimized thanks to lamination of the levitation rails.

The two experimental vehicles Transrapid 05 and HSST 02 have adopted this third type of levitation. Of course, the German magnetic glide has benefited from the know-how accumulated by its predecessors. Before constructing it, Krauss Maffei, MBB, Thyssen and Henschel had to test its various components, beginning with optimization of magnets in the support and guidance systems, and ending with control procedures, while including different configurations of the linear motor and tests of emergency systems. Tests also had to be performed under actual operating conditions. But until now the only installations available were small ones of 800 to 2400 meters. This is why the Consortium of builders for the Transrapid started, in the Ems region between Lathen and Dorpen, the construction of

a 31-kilometer line with three switching stations: a full-fledged testing center with control and operation station for speeds between 300 km/h (endurance tests) and 400 km/h (high-speed tests). In the meantime, German specialists learned a lot from the demonstration of the magnetic slide at the International Transportation Exposition (IVA) in June 1979. For three weeks, a 26-meter long vehicle, weighing 46 tons, transported about 100 passengers on trips from one end of the fair to the other, at a speed of 60 km/h along a 900-meter long track.

As we saw, Japan Air Lines benefited from the earliest West German research. The first HSST 01 test took place only in 1975, in Yokohama, along a 200-meter track, and at a speed of 35 km/h. Since then, trial runs have followed on longer tracks at higher speeds. Model 02 was introduced in 1978. It is longer (6.84 meters compared to 4.2 meters), narrower (2 meters compared to 2.6), heavier (1.8 tons compared to 1 ton), and it carries 9 [translator's note: "9" in original text] passengers at 200 km/h. For the commercial model, a double car, 43.6 meters long, will carry 224 passengers at the same speed.

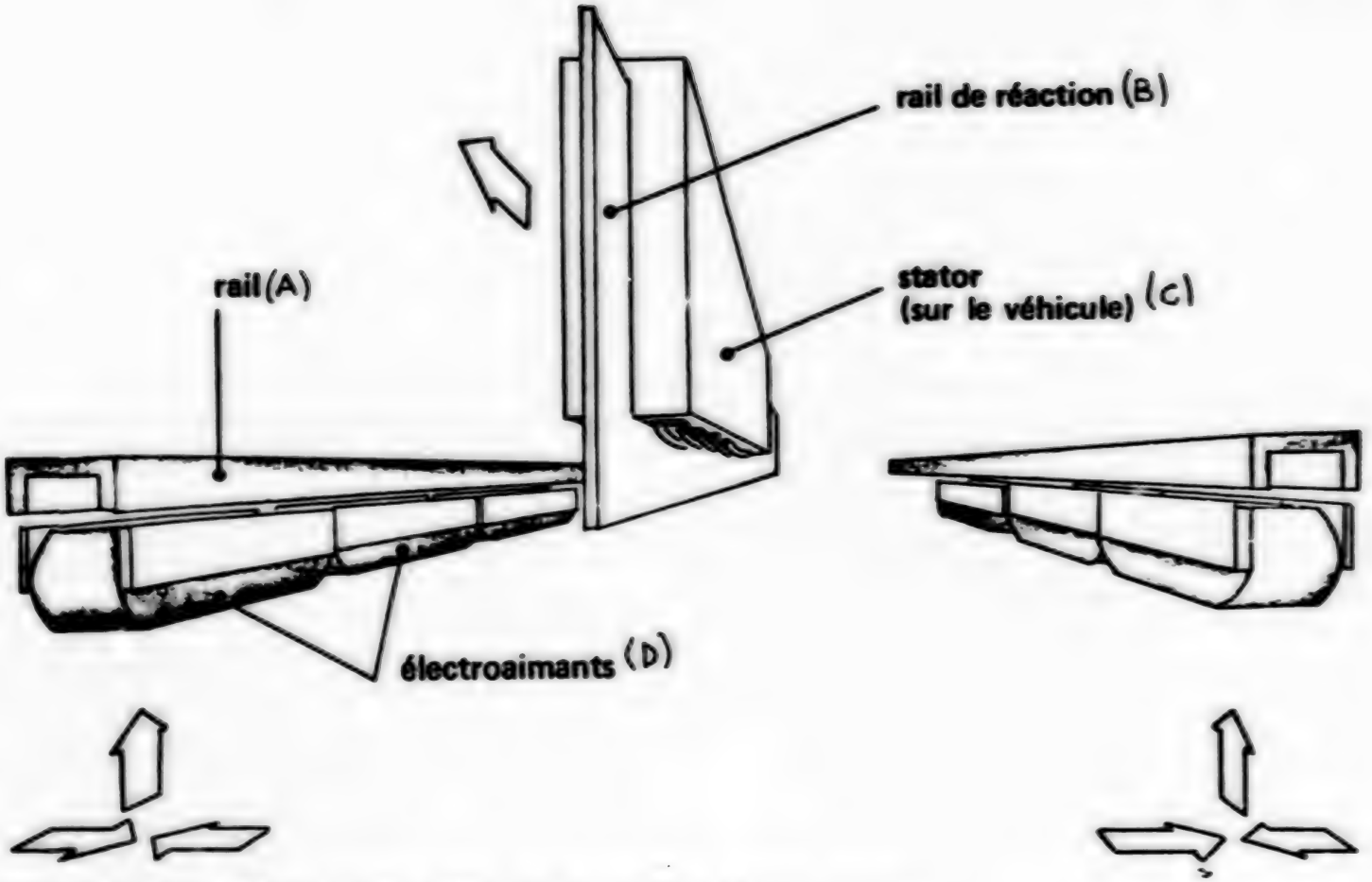
While the Germans and Japanese have chosen the same lift system, they have chosen two variations of the same solution for the propulsion of their respective cars. The Transrapid has a long-stator linear motor, and the HSST has a short-stator.

But the real difference is elsewhere. Japan Air Lines experts have applied aeronautics technology to a ground-based, "floating" vehicle.

In short it can be said that the HSST is a wingless plane, which has led to aerodynamic research on lightweight materials. There is also a difference between the approach of the Germans and the Japanese. For the Japanese airline, the HSST is a vehicle which is complementary to the airplane. It is intended to link urban centers to airports: Tokyo-Narita (66 km), and Sapporo-Chitose (40 km) on Hokkaido Island. Such rapid connections will keep planes competitive against high-speed conventional trains.

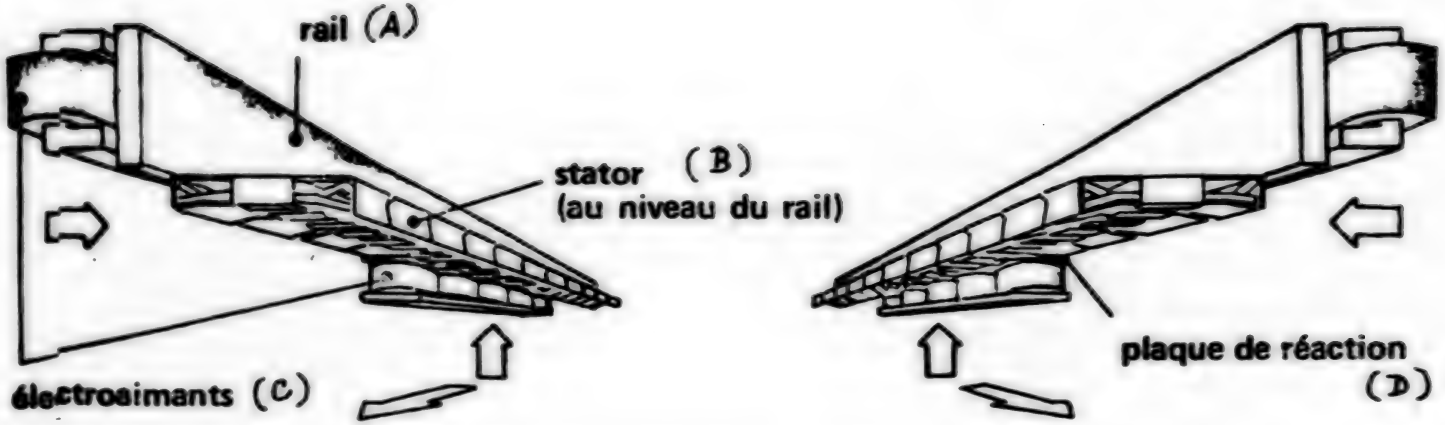
For the Germans, the Transrapid will of course be an excellent transportation vehicle to and from airports. But it is also destined to fit in between railroads and planes as a novel means of transportation, in order to improve traffic between North and South Germany and to link European capitals at 400 km/h.

Thanks to their advantages (speed, reduced pollution, minimal maintenance), linear-motor magnetic-levitation vehicles should gain acceptance as time savers for city dwellers using planes. As a new means of interurban transportation, they have not yet proven themselves. In addition they have to overcome two important obstacles in this day and age: the financial burden of infrastructures, and the consumption of energy. HSST will use 5 kW per passenger at cruising speed, and the Transrapid between 200 and 400 Wh per person/kilometer. This is better than commercial plane performance, but represents a higher consumption than for railroads.



Electromagnetic levitation system with short-stator linear motor.

Key: A. Rail
B. Reaction rail
C. Stator (on vehicle)
D. Electromagnets



Electromagnetic levitation system with long-stator linear motor

Key: A. Rail
B. Stator (at rail level)
C. Electromagnets
D. Reaction plate

Magnetic levitation results from attraction forces between the metal rails and the electromagnets. With a short-stator linear motor (Japanese HSST), the stator is located in the vehicle. For the Transrapid, the Germans have chosen the long-stator, located at rail level.

Long or Short Stator

While "conventional" trains are equipped with three-phase motors, the Transrapid 05 (FRG) and the HSST 02 (Japan) magnetic-lift vehicles are propelled by linear motors.

The latter are known as short-stator when the rail is induced along its whole length (reaction plate), while the stator is located on the vehicle (this is the Japanese choice).

When the stator is located at rail level, it is known as a long-stator because its length is equal to that of the track (German choice).

In both cases, the impulse of the linear motor is controlled by a static frequency changer allowing the motor to serve as a propulsion and brake system.

11,023
CSO: 3102

DIRECTION OF GOVERNMENT SUPPORT OF INDUSTRY DISCUSSED

Hamburg DER SPIEGEL in German 17 Mar 80 pp 37,39, 41, 44

/Interview with Research Minister Volker Hauff in Bonn, by SPIEGEL editors Winfried Didzoleit and Rolf Diekhof: "'Other Countries Envy Us' -- Research Minister Volker Hauff on the Direction of His Support for Industry"; date of interview not given/

/Text/ /Question/ Herr Hauff, together with the North Rhine-Westphalian Land government, you are planning to subsidize the Hoesch steel company to the tune of quarter of a billion marks. What does this gift of millions for a new steel plant have to do with research and development?

/Answer/ First of all, it is only 120 million that the federal minister for research and technology is providing, and secondly, it is not a subsidy. It is technological support in the energy and steel sector for modernization of the Ruhr district -- so this is a program that as you know is backed by all parties.

/Question/ We think differently. When you grant a sum at an interest rate far below the capital market rate and with extremely favorable terms of repayment -- as in the Hoesch case -- then this is a support that deserves to be called a subsidy.

/Answer/ It is a support, that's true, but it is not a subsidy in the sense of a maintenance subsidy as is customary in other countries' steel industries. What we are doing is directed toward the future; it will be helping modernize the Ruhr district, helping preserve jobs there.

/Question/ We have our doubts about this orientation toward the future. The construction of steel plants has been technically perfected. Some things can be improved here and there, but why shouldn't Hoesch be in a position to build a modern steel plant at its own expense?

/Answer/ There is no doubt that Hoesch can do that, but we have very ambitious goals for this project. The first is the so-called hot-work system, wherein the steel is fed directly into the rolling mill with no cooling

after the continuous casting. We don't have that anywhere in this country yet. Secondly, we are going to use carbon monoxide obtained from the steel-refining process for a remote heating system in Dortmund. Thirdly, with this steel plant and its new technology we shall be saving oil as well as substituting coal for oil. Savings on oil will amount to 255,000 tons per year; increased coal consumption will come to 100,000 tons per year. This will mean net energy savings of 180,000 tons of oil per year, or DM 45 million that can be saved.

/Question/ That sounds so reasonable that a steel company of the caliber of Hoesch ought to be doing it without subsidies.

/Answer/ If one assumes that the development risk would be nil, but that is not my assumption.

/Question/ Aren't German companies supposed to take risks anymore?

/Answer/ A nine-figure sum is involved here -- quite a lot for a company in the red. You know, the principle that research and development in industry should be financed only by industry can also be ridden into the ground. Then we of course have no energy-saving technologies available, nor any new jobs, but we have upheld our principle.

/Question/ That sounds good, but once this new steel plant is finished, Hoesch will have to let 4,200 people go. How will this create or maintain jobs?

/Answer/ I don't believe it can be determined yet what will be dropped in the way of jobs following a modernization like this. Hoesch now provides about 15,000 jobs in the Dortmund area. Far in excess of 10,000 of them will be maintained with certainty. Without our assistance there was a danger that all 15,000 jobs would be lost.

/Question/ So you then gave in to this threat by the company....

/Answer/ ... nothing of the kind, nothing of the kind. If Hoesch had come to us and demanded money, saying that otherwise 15,000 jobs would be lost, then I would have said: You've come to the wrong address.

/Question/ You should have held to that. Now all the other steel companies will also want to help themselves from the big pot.

/Answer/ I'd like to put that into broader perspective, if I may. We have a total of about 300 projects under way in the steel sector. It is a fact that we in the Federal Republic have a substantial deficit when it comes to modern steel production installations. Certainly, none of the important technical developments of recent years in the steel sector came from here. But at the same time, the Federal Republic is one of the most

important steel manufacturers in the world in terms of volume, but also in terms of the manpower tied up in this sector.

/Question/ You're making the branch's problems your own. Just because the steel manufacturers let development pass them by, the taxpayer should not have to foot the bill.

/Answer/ That is cynical advice when you consider that hundreds of thousands of jobs are at stake here. I believe that in the development of technology worldwide, we must proceed from the assumption that the state should play a role in supporting research and development. It is not a question of preaching about the market economy; it is one of pushing modernizations that are truly necessary. We must try to maintain the viability of our economy, provide secure jobs and humanize labor.

/Question/ Well, is this an invitation to the steel branch to help itself from the research pot?

/Answer/ No, absolutely not. We have analyzed where the real problems lie. We want to help increase our industry's ability to compete. This is an original aim of our policy on research and technology.

/Question/ Just how bad do you think things are, then, regarding our industry's ability to compete?

/Answer/ The intensity of research and development in our steel industry is clearly below the levels of countries like Sweden, Great Britain and Japan. These are disturbing indicators that must be corrected -- primarily, of course, by way of company decisions. Product-related research and development is first of all the concern of the companies themselves. Through preventive, farsighted measures, the state must see that crisis situations do not develop in which public pressure becomes so strong that neither a Land government nor a federal government can extricate itself.

/Question/ Indeed, the pressure is there in the Ruhr district, but on occasion you also scatter your millions over branches that are operating with sumptuous profits -- in the automobile industry, for instance, which got along for years without subsidies from Bonn. Since 1977, FRG auto manufacturers have all been collecting something.

/Answer/ Absolutely false, absolutely false. The amounts we give out are not uniform at all. VW is getting far more than the others because those in Wolfsburg were the most responsive.

/Question/ Mercedes and BMW are also getting some attention, aren't they?

/Answer/ Our support has not at all been allocated according to companies, but exclusively according to who was prepared to push developments that are very future-oriented and where a market is presently not recognizable.

/Question/ Then aren't you supporting precisely those things that have to be pursued by the industry anyway -- for example, because the imposition of legal conditions will force them to?

/Answer/ I still have a precise recollection of the political debate in our country in connection with the law on leaded gasoline. People were asking how we could pass such a law without knowing whether it would actually work. I simply do not believe in operating with conditions when you don't know whether they can actually be observed.

/Question/ Even though you were right on the beam with the leaded gasoline law?

/Answer/ My basic assumption is that such long-range research projects are reasonable, also in cooperation with the automobile industry. We want to know, for example, what the possibilities will be in energy consumption for automobiles in the 1990's. Then we'll have firm bases for being able to discuss actual expectations.

/Question/ You're paying a stiff price for this information.

/Answer/ On the whole, I consider the DM 53 million spent on motor vehicle research in 1979 to be money well spent.

/Question/ You can also look at this from a different point of view: You're paying out too much money for things that are of little benefit to the public but of great benefit to the companies concerned.

/Answer/ I am very keen on intensifying the debate on this issue. And I would be grateful if everyone who has criticized my ministry's support policies would also provide specific data on unsuccessful projects on the part of industry, associations, trade unions, universities or major research institutes. I shall then assign a panel to investigate these projects....

/Question/ ... yet another committee....

/Answer/ ... I shall assign a panel of people who were not charged with making the decision to provide support. Their job will be to find out whether there is really a significant number of projects that should not be objects of state support.

/Question/ Rather like monitoring the success of projects?

/Answer/ Yes. Once before, we had a study done on the effects on employment of government support of research and development. We found that Research Ministry support programs provided 400,000 jobs in 1979. Over half of these were the result of innovations, or new products, that came about only through support for technical development.

/Question/ Such developments would not have gotten going without subsidies?

/Answer/ That is the second question we asked. How great, actually, is the piggyback effect? And it is very, very disparate in the individual support programs. The effect was very great in data processing, for instance, and this is one of the reasons why I am stopping the support program in data processing. It is expiring.

/Question/ This will be not at all pleasing to the Siemens firm, traditionally one of your best customers.

/Answer/ That you will have to ask Siemens itself. When the support program started, they had a 6-percent share of the market in the Federal Republic; they now have a 20-percent share for medium-sized and larger computers, and the market is expanding at a rapid rate.

/Question/ We consider the computer support program in particular to have been a million-mark failure.

/Answer/ I certainly won't conceal the fact that I would like to have gotten out a little sooner. But overall, without lapsing into euphoria, I consider the result satisfactory. This was also confirmed recently by the Bundestag Research Committee.

/Question/ Even though Siemens, despite all the support for new products, is now buying large computers from the Japanese Fujitsu company?

/Answer/ I'd rather not talk about Siemens' company policy, especially since it is now assuming total responsibility for its data-processing development.

/Question/ This year your ministry is providing around DM 5 billion worth of support for more than 6,000 projects. Have you established new priorities?

/Answer/ Your question conveys the impression that 6,000 projects were selected arbitrarily. Our policy in the area of project-oriented, direct support is being carried out within a system of specialized programs. At present there are 14 such programs. Included, for example, are marine research, development of energy sources, space technology and humanization of labor.

/Question/ What do you consider to be the successes of your policy to date?

/Answer/ The mere fact that we succeeded last year in creating 400,000 new jobs or in maintaining our position in the face of international

competition is enough for me. Added to this is the fact that we have achieved very respectable results in basic research.

/Question/ We have also spent respectable billions for nuclear research and thus locked ourselves in on a kind of energy that has become highly suspect today.

/Answer/ The opinion of the FRG government is unequivocal on this: Efficient and economical uses of energy have priority. Secondly, we say that we want the preferential use of domestic hard coal. Thirdly, we want to develop new sources of energy. And so far, every reasonable proposal made has also been supported. Our fourth and last priority here is that we also consider acceptable the limited use of nuclear energy insofar as we are able gradually to solve the problem of waste disposal.

/Question/ You cannot use this as proof of your success. First you put billions into nuclear research, and now you invest so that you might not have to make use of this energy?

/Answer/ From the technical standpoint, the peaceful use of nuclear energy is a clear example of successful government support of research and technology. No matter how one may assess the risks inherent in technology, we have truly reached the top internationally....

/Question/... and have paid too much in the process....

/Answer/ ... the fact is that through 1972, nuclear technology was given disproportionate support compared to other energy sources. This was the reason why we started in 1973 to develop our program of non-nuclear research.

/Question/ Another area where the dubious success of your efforts is becoming evident is electronics -- in the development of chips, for instance, the Federal Republic is still a developing country after millions of marks spent on research.

/Answer/ There is no way you can call this a general failure, even though I wish there were greater corporate vitality, especially in the application of chips. It would make it much easier for me to put money into this development with truly good conscience.

/Question/ Minister Hauff, the bureaucratic outlay for this kind of research subsidy is immense, and the prospects of success are questionable. Would it not be better to dissolve your ministry?

/Answer/ I don't think we're suffering from bureaucratism. I'm against treating problems like these in such an undifferentiated and across-the-board manner. I think our past development has essentially been very successful. Other countries envy the support we give to research.

[Question] Critics think that indirect support for research by way of tax breaks would be more effective than our previous practices.

[Answer] It doesn't matter what kind of tax measure you use: You won't be able to further the development of coal-processing plants or a radio/television satellite by way of indirect support. You can't use tax measures to arrive at an effective assessment of technological results or to change the technical base of local public transportation.

[Question] Despite basically indirect subsidies, a case could be made for a few large-scale projects that could be supported in a direct way and strictly monitored for success, but you are subsidizing 6,000 projects year after year. And each one of these has to be put through your administrative mills.

[Answer] I would discuss gladly and at great length the role that we have assumed in the application of electronics, with dozens of small-scale programs, for example. I would be very glad to discuss the watchmaking industry, which has been put back on its feet with our support for research. And I would be very glad to argue with you about how the German machine-tool industry would fare over the next 10 years without our support programs....

[Question] ... is it necessary, then, to hold on to every white elephant at any price?

[Answer] ... in this case you're forcing a door that's already open. I am against broad-based supports for that reason. I say again: We support the fleet of foot; we support those who are out in front of the pack, who really have ideas, who make good suggestions for new products. And then we really give these people solid backing.

7458
CSO: 3102

GAS PRODUCTION FROM METHANOL INITIATED

West Berlin DER TAGESSPIEGEL in German 8 Mar 80 p 9

[Article by gih: "Gasag Methanol-Cracking Plant Soon To Begin Test Runs -- First of Three Development Stages Will Provide 500,000 Cubic Meters of Gas Daily"]

[Text] Gasag [West Berlin Gas Company] is only a few days away from breaking new ground in process technology: the production of gas from methanol. Work has almost been completed on the first of three development stages at the Mariendorf plant. Test runs are to start by the beginning of April at the latest. The peak-load installation will be ready for operation in May. The first stage will make it possible -- for the first time worldwide -- to produce 500,000 cubic meters of gas per day. The other two stages -- which according to the contract with Lurgi, the manufacturer of the installations, are to be finished early next year at the latest -- will each be capable of producing 1 million cubic meters per day.

Gasag is expecting a maximum output of between 8 and 8.5 million cubic meters per day, but this figure is only for a few (winter) days in the year. By the time the entire methanol installation is completed, Gasag will be able to supply around 10 million cubic meters per day. While the benzine-cracking installations will be covering the full base load once the coking plant is shut down at the end of this spring, the methanol installations are not to be switched on until 75 percent of capacity has been reached. This is because the advantage of methanol-cracking lies in the fact that the plant "can be brought up to capacity from a dead start in 8 to 10 hours," according to Jurkat, director of the Department of Technical Chemistry and Industrial Management. By contrast, benzine-cracking installations require up to 3 days to become fully operational.

Moreover, the methanol technique is more economical when used only to cover peak loads, for although the cost/benefit ratio is more favorable with benzine, the methanol technology costs 50 percent less: about

DM 10 million for the completed first stage, including various components that will also be used for the other stages. Stages II and III will each cost DM 15 million.

Gasag began developing this technology as early as 1977. A small experimental installation at the Charlottenburg plant put out 600 cubic meters of gas per hour and provided essential experience for the new installation, which produces 20,833 cubic meters per hour under full-load conditions. The process involves mixing 16,350 kg of methanol with the same amount of steam and then bringing the mixture to a temperature of 185° using the heat that is released from a later step in the processing. From there the steam flows into an oil-fired superheater which raises the temperature to between 440° and 470°.

Under this pressure of about 16 atmospheres, the mixture is passed over a nickel catalyst, which process unleashes six different chemical reactions. There the substances are heated to around 610°. This heat is then recycled back to the first phase, so that the entire process requires only 1,130 kg of fuel oil per hour. The raw product is then a gaseous mixture that differs only slightly from the regular city gas made from benzine. Percentages by volume are 45.1 percent hydrogen, 28.8 percent methane gas (CH_4), 22.2 percent carbon dioxide (CO_2) and only 3.9 percent of the poisonous carbon monoxide (CO).

7458
CSO: 3102

PROTOTYPE WIND ENERGY UNITS BEING BUILT

Helsinki HELSINGIN SANOMAT in Finnish 29 Feb 80 p 19

[Article by Jyrki Maunula: "Energy for Households From a Windmill"]

[Text] At long last, people in Finland are getting involved in the exploitation of wind for energy.

At the present time in Hattula there are under construction prototypes of two wind energy units, which it is believed will serve as models for the beginning of commercial mass-production.

Until now, the utilization of wind has been studied mainly by do-it-yourself men, each working separately and repeating the mistakes of others over and over again.

There has been established in Hattula a working group of engineers, which has combined forces with Ilmari Ekholm, a man of many accomplishments in the field of metals, who has already built a wind energy unit on his own.

VTT [the State Technical Research Center] is also working behind the scenes. They have already helped in requesting a research grant from the Ministry of Commerce and Industry.

The goal: a home energy unit

"We are trying to develop workable 1-100 kilowatt wind energy units suitable for Finland's weather conditions for home use," says Y. S. Peltonen, the leader of the group, which has organized itself into a company called Oy Finergia Ab.

At first, a "mill" with sails 5 meters in diameter and a 2-5 kilowatt generator will be built in Ekholm's workshop. A wind energy unit of this size can produce from 5,000 to 20,000 kilowatt-hours per year.

The project is being approached in a very logical way. The engineers have collected information about windmills from all over the world and have calculated the most advantageous angles and curves for the sails with the aid of computers.

Right now they are making a model of a sail in the shop out of wood and steel. From that will be made a mold for fiberglass, and the inside will be filled with polyurethane or carbon fibers.

When this smaller version is ready, they will begin construction of the really big energy unit which Ekholm started last year. Its 13-meter sails will rotate at a height of 24 meters and will drive a 20-kilowatt generator.

The smaller wind energy unit was designed to produce electric power for a summer cottage, for example, and the larger one could satisfy the energy needs of a farm.

Finland has wind

A few weeks ago, one representative of a large power plant ridiculed the efforts of those working with wind here, calling them crazy, because Finland does not have such strong winds as there are for example along the North Sea coast in Denmark.

The working group has a whole bundle of wind studies to refute that claim. According to those studies, the wind velocity on Denmark's coast is between 4 and 5.6 meters per second, depending on the season.

"But our coast doesn't fall far behind that at all. The yearly average in Helsinki is 6.3, on Valasaari island in Vaasa it is 7.0, and in Rauma 5.2. Inland, Rovaniemi has a wind velocity of 4.4 meters per second, Kauhava 3.8, and around Tampere 3.8. During the dark and cold winter season, when electricity is really needed, the numbers are significantly greater."

The group reminds us further that more wind can always be obtained by making the tower taller and going to higher places.

"Home wind energy units could be especially useful on our islands, where it is difficult to run electric lines and expensive to bring in liquid fuels."

A wind energy unit is best used for heat in connection with a heat pump, according to the group, because then conventional heating is available as a back-up during calm periods of cold.

VTT will test energy units for import

In the negotiations with VTT, the main outlines of the next phase of work have been agreed on. According to the plan, Finergia's task will be to collect data world-wide, plan and build prototypes suitable for us, and begin mass-production after VTT has tested them.

VTT's role is to make all kinds of measurements, because it may soon need as much information as possible as wind energy salesmen arrive from other countries. If production of wind energy units is approved without information in advance, we may get into difficulty in the areas of frost and cold.

Is Finergia then aiming for furious industrial production and commercial success after the initial tests? The men answer in unison: "Of course!" That is precisely their target: the manufacture and sale of large and small wind energy units for household use.

"There is nothing to be ashamed of in this, because at the same time as we are replacing expensive imported energy, we will be employing perhaps hundreds of our own people, and we are using Finnish raw materials."

The boys have calculated that by building a wind energy station on even one farm or house out of ten, some half-million tons of oil would be saved annually. With that, quite a nice sum of money would remain at home.

When the men of Finergia are busy at work on their models for the sails of the small wind energyunit in a corner of Eckholm's auto repair shop in Parola [village in Hattula], a layman wouldn't understand half of their talk.

Peltonen reminds us to write about the importance of being able to adjust the angle of the sails while they are in motion, in case the wind gets too strong. Also other kinds of braking and storm protection are important: lack of these has been the cause of destruction of the windmills built by most Finnish inventors.

Ekholm says that a "wind rose" is a much better idea for keeping a windmill "Wind power would then save about 2,100 liters of oil and 5,500 kwh of purchased electricity, for a savings of 3,300 marks."

The pay-back improves immediately if the unused electricity can be sold to a distribution network. For 33,000 kilowatt-hours one would receive 2,300 marks, so that the annual production of the energy unit would be 5,600 marks. Calm periods would reduce that figure by a couple of thousand.

"But the bill for energy would still be only 2,900 marks a year instead of 8,500."

However, one would still have to take into account maintainance and capital costs, even if we too will soon have the opportunity of having the government pay for 30% of the cost (for example 30,000 marks). The progress of inflation and the rising cost of fuels are some incalculable factors. One bright side of the picture is freedom from pollution.

For heating a single-family home, a corresponding 2-10 kilowatt wind energy unit with 5-8 meter sails would be sufficient. Wind electricity would heat the boiler for central heating, the ovens, and the water-heater.

"A two-kilowatt power station with five-meter sails would produce about 6,000 kilowatt-hours a year, if the wind velocity is 5.5 meters per second. This kind of installation would cost between 20,000 and 80,000 marks," Peltonen estimates.

For lighting a summer cottage and powering a radio and television, a 500-watt wind unit would be enough. If it is desired to use electricity for basic heating, the unit has to be bigger, around two kilowatts.

When the final totals are arrived at, the figures show that use of wind energy is reasonable.

The smaller wind energy unit should be ready soon enough that initial tests can be completed before the exhibition to be held in Vantaa in May, for which it is planned to be the main attraction.

The larger mill will begin to spin in Ekholm's yard by the time of the first winds of autumn.

9611
CSO: 3102

CHAMBON ON REORGANIZATION OF RESEARCH EFFORTS

Paris AFP SCIENCES in French 31 Jan 80 pp 4-5

[Text] Paris--At the ceremonial presentation of the CNRS [National Center for Scientific Research] gold medal award (see AFP SCIENCES No 203 of 24 January 80, pp 2-3), the policy address was not delivered by the minister for universities, Mrs Alice Saunier-Seite--who undoubtedly felt that, the decrees pertaining to the CNES and INSERM [National Institute of Health and Medical Research] researchers having been published, no further comment was necessary--but by the recipient of the award, Prof Pierre Chambon--who seized the opportunity to say what he felt at heart.

We reproduce below just a few significant excerpts wherein Professor Chambon categorically rejects certain aspects of the reform and approves others:

"Incidentally, I am afraid my laboratory cannot serve as a testimonial to the need for mobility of researchers at all levels, the magic potion that, it seems, should infuse French research with new life: All of my laboratory's present cadres are my former students, and I myself, except for an American spell, have always worked in the same laboratory! It appears to me that there is a technocratic illusion around the notion that researchers, placed on a footing very close, in fact, to that of government employees, can be motivated and 'regenerated' simply by compelling to move around. This is to not understand that genuine research involves a total personal commitment that nothing can impose. It is to not understand also, and this is more serious, the nature of modern research, which requires a mastery of increasingly numerous and complex techniques that can only be acquired over an extended period. Continuity has been one of the basic factors in our success, that which has enabled us to build our work tools. Without this continuity, it would have been impossible to bring together the indispensable talents.

"But I cannot pass in silence over the fact, without misrepresenting the truth, that if my laboratory has been able to develop rapidly and to remain at the top over the past 10 years, it is in part because it has benefited

from a source of extraorganismal funding that I have been able to use with ample flexibility to respond immediately to the unpredictables, such as the need to attract a foreign researcher or to purchase a piece of equipment suddenly become indispensable! Is it known that our first electronic microscope, the one with which Pierre Oudet unveiled the existence of nucleosomes, was procured thanks in large part to those funds? Is it known too that over the past 4 years, more often than not for periods of 2 years, 23 foreign researchers have worked on my team, which includes also six teaching-fellow researchers, three CNRS and two INSERM researchers, assisted by four CNRS and one INSERM technicians? If I mention these facts, it is because I am deeply convinced that our success owes much to the existence of this parallel funding and its flexibility of use.

"Far be it from me to pretend that financial means in themselves can assure the effective development of research in general and of biological research in particular. But if France's good fortune is felt to reside, as indeed it does, in its brains, then the means must be given to those brains to compete on an equal footing with the researchers of the other developed countries. Highly structured teams have irremediably replaced the lone researcher; the cost of research has risen far more rapidly than the GNP. Certain choices accompanied by a redistribution and an augmentation of means can no longer be avoided. We cannot, without settling for inefficiency, hope to do everything in France, much less do everything everywhere in France. Cooperation on the European level is more than ever necessary, as is the introduction of foreign experts into our evaluation proceedings. Well-meaning persons will object that this will only speed up the eviction of the French language from the biological literature. But is France's scientific renown to become more based on the use of the French language than on the quality of the work produced in its laboratories and on the attraction these can exert on foreign researchers? Profound changes will be indispensable to the establishment of structures that are more fluid, better suited to the demands of research, and genuinely motivating to the researchers, without, however, indulging in the illusion that everyone between the ages of 25 and 65 can search and find! In this regard, I have become convinced, based on my daily experience as the leader of a laboratory in which teaching-fellow researchers are closely associated with staff researchers, that more cannot be demanded from one than from the other of these groups. Changes must also be made in the universities as well as in research organizations. Whether or not these changes are possible will depend as much on the researchers as on the organizers of research. Will there be on the part of one as on the part of the other the realism and the courage needed to bring off successfully the required changes? I sometimes doubt it when I see how secondary the true interests of research appear to some who, whatever their side, make a political football of it, and to others for whom the desire for security in all its forms has become second nature.

A large gathering of leaders in research attended the CNRS gold medal award presentation. Among them were Mr Pierre Aigrain, secretary of state for research; Mr Charles-Georges Thibault and Mr Jacques Ducuing, president and director general, respectively of CNRS; Mr Laudat, director general of INSERM; Mr Pierre Creyssel, president of MIDIST [Interministerial Mission for Scientific and Technical Information].

(In our next issue of AFP SCIENCES we will publish a list of the recipients of the silver and bronze medals.)

9399
CSO: 3102

FRENCH-SAUDI ARABIAN SCIENTIFIC, TECHNICAL COOPERATION

Paris AFP SCIENCES in French 31 Jan 80 p 3

[Text] Paris--Dr Obaid, president of the Saudi Arabian National Science and Technology Center, at the invitation of Mr Pierre Aigrain, secretary of state to the prime minister in charge of research, visited Paris 20-24 January 1980. This first official visit by the Saudi Arabian head of research included a survey of French-Saudi Arabian scientific and technical cooperation in general and a more detailed study of the solar energy, agronomy, scientific and technical data processing, and astronomy sectors.

On solar energy, Dr Obaid, met with Mr Durant, chairman of the Solar Energy Commission and with the top officials of the PIRDES [Interdisciplinary Program for Research and Development in Solar Energy] the CNRS [National Center for Scientific Research] and the French Petroleum Company.

Dr Obaid, who is in charge of creating an astronomical observatory in Saudi Arabia also had meetings with the management of the INAG [National Astronomy and Geophysics Institute] and visited the REOSC [Optical Research and Study and Associated Sciences].

A meeting involving the Ministry of Agriculture, the INRA [French National Institute of Agronomic Research] and the GERDAT [Study and Research Group for the Development of Tropical Agronomy] examined the possibilities of cooperation in the field of agronomy.

In a meeting with the Atomic Energy Commission, Dr Obaid addressed the problems of Solar energy and desalination.

Lastly, he held discussions on scientific and technical data processing, and the DARC [expansion unknown] automated chemical data processing system was demonstrated to him at the Prof Jacques Emile Dubois Laboratory, Paris VI.

9399
CSO: 3102

FRENCH-INDIAN INDUSTRIAL, COMMERCIAL COOPERATION

Paris AFP SCIENCES in French 31 Jan 80 p 2

[Text] New Delhi -- At the conclusion of President Valery Giscard D'Estaing's visit to New Delhi 25-29 January, the following seven agreements were signed between India and France:

1. A protocol on development of industrial and trade cooperation between the two countries over the next 5 years.

2. A memorandum of partnership between the French and Indian governments in the building and financing of an aluminum production complex in the state of Orissa.

3. An agreement in principle to increase coal production in India with French aid and to consider the possibilities of exporting Indian coal to France.

4. A protocol on technical and industrial cooperation establishing a working group to implement it.

5. A protocol on agricultural cooperation, providing for specific projects at Rajasthan, Kerala and Uttar Pradesh.

6. A cooperation agreement in oceanography, providing for the building in India of a center and of an appropriate submersible.

7. A cooperation agreement on research in the use of renewable energy such as solar.

A planned eighth agreement, on television, will be signed later, certain technical points of which have yet to be worked out.

9399
CSO: 3102

MAGNETIC-BEARING KINETIC ENERGY BATTERIES DEVELOPED

Paris INDUSTRIES & TECHNIQUES in French 31 Jan 80 pp 51-52

[Article by Jacques Houbart]

> [Text] The innovativeness required for space projects is yielding a profitable fallout in various sectors of activity "on earth." But it sometimes takes a long time for the fertilization of that fallout by advance technology industry. In the case of applications on earth of kinetic energy batteries (ACE's), the fallout has been so rapid that it will probably be operational before the application is made aboard a satellite.

By signing a 2.3-MF contract with Aerospatiale for the production of an experimental model of a kinetic energy battery to be used in telephone exchanges, the General Directorate of Telecommunications has just ushered in a new era: from now on space is out of the ghetto of de luxe technologies and conducting a real-time dialogue with earth.

Improving the Wheel

The Aerospace engineers who, as members of the team of Pierre Boubea, a scientific and technical assistant to the management of the Etablissment Mureaux, have developed the ACE's, are fond of saying that they did not invent the wheel but are content to improve it.

Through the use of magnetic bearings, the inertia wheels originally designed for satellite equipment constitute a revolutionary technology for the storage of high-yield power that is always available. Aerospatiale's solution--the magnetic bearings benefit from passive radial centering and require only an axial slaving--has considerable advantages over other technologies in terms of simplicity and reliability.

No Friction Loss

In the ACE's, there is no mechanical-friction loss, so that there is the advantage of an available, stored power source; recharging is more flexible

than it is in the case of chemical batteries; and ACE's can be used continually for anywhere from 10 to 20 years. Also emphasized is the value of a system that is noise-free and does not cause pollution. No special maintenance is required.

In the telephone exchanges, the ACE will serve as an emergency power supply and permit avoiding interruption of service during outages in the power network of the EDF [French Electricity Agency]. The experimental model, delivered to the CNET [National Center for Telecommunications Studies] before the end of 1979, stores 1 kW/hr of power, which in 20 minutes can be increased to a constant power of 3 kW. This is well suited to the needs of emergency units that must cope with major and minor power outages, such as operating blocks, data processing centers and elevators.

Smoothing Out

A wide range of ACE's is now being studied at the Etablissement Mureaux and is generally aimed at smoothing out fluctuations in the power mains, to permit considerable gains in power and the number of power stations. Such an application could involve several batteries in parallel, each with 10 NW hr, with [total] stored power of 100 MW/hr.

Similarly, the ACE power storage can involve irregular operational systems like windmills or solar devices. In automobile propulsion, the use of combined means including ACE's should permit large savings in fuel.

5346
CSO: 3102

EFFORTS TO ENCOURAGE AIRCRAFT INDUSTRY NOTED

Paris L'USINE NOUVELLE in French 28 Feb 80 pp 80-88

[Article by Antoine Thiboumery]

[Text] Is not our aeronautics industry overcautious? Aircraft builders, engine and equipment manufactures, and subcontractors are unanimous in recognizing that it is. The only solution: get the aeronautics machine going again.

France does not have enough faith in its aeronautics industry. Today, while the Airbus is achieving unexpected success (400 airplanes on firm order or option) and AEROSPATIALE [National Industrial Aerospace Company, also known as SNIAS] helicopters are also breaking all records (more than 5,950 units sold up to now), not to mention the thousands of military aircraft built and marketed in the last 30 years by Avions Marcel Dassault-Brequet Aviation. France seems unconvinced of the fantastic future open to this sector.

A paradox! But that is nothing new in the cyclical behavior of that industrial branch. In fact, how can one forget the severe recession in air traffic following the energy crisis of 1973? Or the dry spell for Airbus Industrie from 1976 up to April 1977? "Everybody in the industry is overcautious," is the opinion of Roger Beteille, the director general of Airbus Industrie. "However, we are compelled to go forward. If we do not we are sure that we are going to move backwards very quickly."

At Toulouse today the man who has been called "the father of the Airbus" hesitates to talk more freely. Understandably. If he inadvertently were to say a word too much...it is easy to image what use the competition, always on watch, could make of it. Nevertheless, with all the prudence and diplomacy which characterize him, Beteille recognizes that now he must do his utmost to correct, and overcome, the reluctance of French manufacturers. "Our logic," he discloses, "is not to let the unexpected opportunity which has arisen slip away."

What is involved? From here to the year 2000, that is for the next 20 years, which is the service life of an airplane, the world market in civil aviation should represent a total of 6,000 new aircraft. But the biggest outlet will be for aircraft of the Airbus type, a total of some 2,000 to 2,500 airplanes.

Right now the customers of Airbus Industrie --more than 35 airline companies--have stated that they estimate their requirements at 800 or 900 airplanes in the next 20 years. "To say that Airbus Industrie must be prepared to construct 1,000 airplanes is completely reasonable," said Beteille, "while only 2 years ago that would have appeared raving madness!"

On the whole the experts all believe that in the coming 15 years the potential market for the Airbus amounts to 150 billion francs. A gold mine. In other words there remains nothing else but to "roll up one's sleeves" and finally consummate what has been decided upon, that is, build the Airbus in cooperation with the Germans, Dutch, British, and Spaniards. "Everything else is merely detail," Beteille concluded.

Although Airbus Industrie is tapping its feet impatiently waiting to see French manufacturers further commit themselves to moving forward in the aeronautics sector, it is primarly thinking of AEROSPATIALE. French aeronautics in fact is today based upon three large components: first, the aircraft builders (Airbus Industries, AEROSPATIALE, and Avions Marcel Dassault-Brequet Aviation) not to forget, obviously, the engine manufacturers (SNECMA and TURBOMECA); second, the equipment manufacturers; and third, the subcontractors.

Airbus Will Not Solve Unemployment Problems

AEROSPATIALE--National Industrial Aerospace Company (SNIAS)--today employs some 40,000 persons, subsidiaries included. "Very sketchily it may be said that AEROSPATIALE's workload is tending to increase essentially because of the Airbus," explains Joseph Millara, assistant director general of the national company. "But the company's other activities are experiencing some stagnation." Thus the aeronautics firm's present policy above all else consists of not confusing speed with precipitate action.

There are two reasons for this caution. "First of all," said Millara, "we know that at the end of 1981, according to a study performed by officials of the defense ministry, sales of Avions Marcel Dussault are going to encounter some recessions." Why this decline? It can be explained in particular by the inevitable bottoming out which will occur at the time when Dassault's customers are going to switch over from the present aircraft (Mirage III, 50, and 5) to the new aircraft of the Mirage 2000 and Mirage 4000 type. Now this turn is foreseen for the end of 1981...

The second reason is more general. "How can one fail to have second thoughts when observing the ravages in the world caused by the economic crisis?" the assistant director general of SNIAS wonders.

Today SNIAS prefers to consolidate its position. An example? Even though it is true that the Airbus program between now and 1982-1983 may require employment of 5,000 more persons (than the present staff) that is not to say that AEROSPATIALE is going to take on 5,000. In other words "the Airbus will not solve the unemployment problems" in Millara's words. At the very best it should make it possible, by means of transfers, better to get around the expected drop in military aircraft construction....

Right now the tactical missiles division as well as the ballistic missiles division are responsible for performing work for the Airbus program. This policy has made it possible, the national company emphasizes, at least to keep the present staff and stop technical unemployment. Certainly, the start of the A 310 program (the small 200-seat Airbus) should assure, until 1981, a temporary work load as far as fabrication of new tooling is concerned. But once that is completed something else must be found.

Restoring the Subcontract Cushion

However, it must be added that since the second half of 1978 AEROSPATIALE has been acting to restore its "subcontract cushion." In this connection, during the crisis years SNIAS, and particularly the aircraft division, saw its subcontracting "backlog" reduced to its very lowest level. At the depth of the recession subcontracting was barely more than 5 percent. Today the figure is a little higher and towards the end of 1981 should again be at the level of from 20 to 25 percent.

Business Statistics

Evolution of business volume of aerospace industries and employment since 1975

Year	Consolidated Aerospace Business Volume (Millions of francs)	Equipment Business Volume (Millions of francs)	Number of Employees
1975	15,800	3,870	108,915
1976	19,900	4,700	107,454
1977	22,026	4,820	103,295
1978	24,225	5,370	103,424
1979	-	5,900 (estimated)	-

Sources: GIFAS and AVIATION MAGAZINE

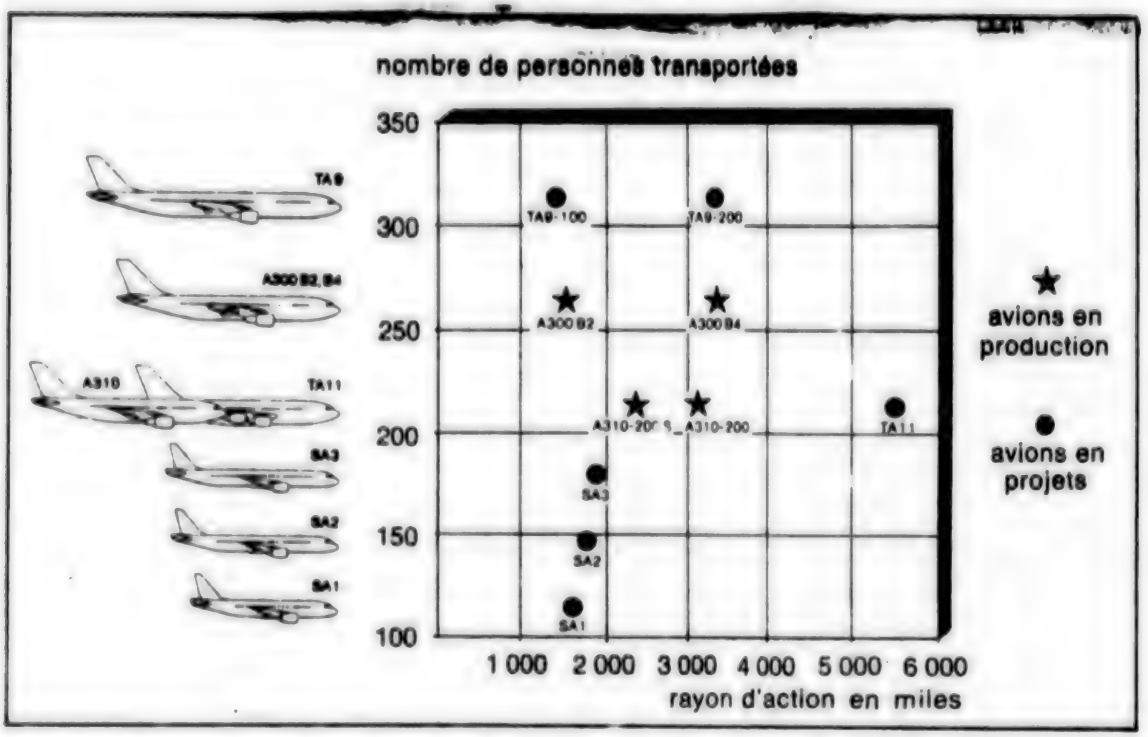
The evolutions in the last 5 years shows a slight decline in the part occupied by equipment in the total consolidated business volume of the French Aerospace industry, accompanied by a parallel decline in employment, with the low point in 1977, the black year for the companies collaborating in civil programs. The increase now seems is in part a recovery from that bottom.

Why so slow a climb? AEROSPATIALE is actually an "enormous" subcontractor. The proof: its leading customer is named Marcel Dassault. In fact, SNIAS has built 29 percent of the Mirage III and V; 19 percent of the Mirage 2000; 6 percent of the Super-Etendard; 7 percent of the Alpha-Jet; 21 percent of the Falcon 10; 56 percent of the Falcon 20; and 57 percent of the Falcon 50!

Does AEROSPATIALE then intend to curl up upon itself? "In truth, we are encountering a number of difficulties," Millara recognizes, "when it is a matter now of having recourse to new subcontractors." In the opinion of the assistant director general two factors are responsible for this state of affairs; on the one hand, subcontractors have been hit very hard in the last few years and their competitiveness, as much technically as at the levels of quality and schedules, show the effects of that; on the other hand, it is not uncommon to find, among the subcontractors who better weathered the crisis, tougher heads of enterprises (very firm on the matter of prices) and because of that, much less attractive to the principals.

Last, a third reason must also be advanced: giving out parts of the Airbus, since it is above all this aircraft which is involved, is too often proposing work upon very large elements. Rare are those subcontractors who have the necessary equipment available. Furthermore, at this level can one in truth speak of subcontractors? The investments are gigantic (see the boxed text "Things Are Better for the Press at Issoire"). There remain the myriad of other subcontractors whose working staffs and equipment are more modest.

The Airbus Family Is Growing



Airbus Industrie has all the descendants of the European A 300 aircraft on the shelf.

KEY: 1. Number of passengers transported
2. Aircraft in production
3. Aircraft in planning stage
4. Range in miles

Greater Speed Is Needed

All this often results in more attractive prices for the principal. "The paradox," Millara continues, "is that above all else the subcontractors are taking elements which are not Airbus parts but parts which we formerly subcontracted for Dassault!"

Thus, the story goes that a part which Dassault wished to see fabricated in the Paris region by a SNIAS plant was actually sent to Great Britain, finally winding up in a plant in western France...belonging to SNIAS. "This shuffling is current money in our business. If you knew all that actually happens you would be amazed!" whispers a manufacturer, mysteriously and maliciously.

It is undoubtedly time to bring a little order into all this. Some do not hesitate to talk of cottage industry! In short the French have to make more progress in this area. But above all else there must be greater speed.

In fact, Avions Marcel Dassault-Brequet Aviation (AMD-BA) would like the public authorities to come out of their isolation and give more support to the development of the Mirage 4000, the air superiority and penetration airplane with twin SNECMA M53 jet engines. "This is the first time in the world that a military aircraft is being developed with the developer's own funds with only the help of manufacturing enterprises by themselves," one is reminded at the company's headquarters, and "we have been telling this to the government for a long time!" Apparently without success. But Dassault says nothing more about it; he is stingy with statements. The word "discretion" is emblazoned in gold letters on the facades of his establishments....

However, for several months some controversy is taking shape. "Dassault has problems?" "Dassault has run out of luck?" "Dassault no longer wants to sell airplanes?" All are questions which the French firm sweeps aside with scorn and contempt. "All of those are only fairy tales."

All the same is it not true that significant delays have arisen in the perfection of the first Doppler impulse radar (RD1) developed in France by both Thomson-CSF [Thomson-General Radio Company] and EMD [Marcel Dassault Electronics], a group subsidiary, which is to equip the Mirage 2000 airplanes purchased by the air force? Is it not also given to understand that there still are some misgivings about the performance of the Mirage 2000's engine, the SNECMA M53 (the same one that is used on the Mirage 4000)? Last, as far as electronic equipment more generally (weapons systems and active air-air self-guidance systems) are concerned, is it not rumored that France is also behind the Americans?

Engines: Reasons for Hope

What are the facts? "The future is not gloomy," we are told at Dussault. Better still--the assured work load for the French aircraft builder is 100 percent up to the autumn of 1981. The last fiscal period, by the way, was excellent: orders for more than 13.7 billion francs entered, of which exports alone were 10.6 billion. Certainly, American competition is becoming fierce. The latest battle, for delivery between now and 1991, of 75 airplanes to Australia is proof of that. "We still have a 10-percent chance, and no more, in this market. We are not deceiving ourselves in any way," explains Alfred Segura, AMD-BA, director of press and information services.

Today the American military aircraft builders are intensifying their investments in order to maintain their competitiveness. France obviously cannot fall into step. But neither is it possible for France to gain even though the French government's policy of independence places our country in favorable position among the states which refuse to be supplied either by the United States or the Soviet Union. More than ever the aeronautics industry seems to be in need of help, which is widely given to aircraft builders across the Atlantic.

The position which France has gained in the area of aircraft engines also bears promise. The big event of this year's beginning: the decision of the U.S. Air Force to reequip its KC 135 tanker airplanes with the CFM 56 French-American Turbojet manufactured cooperatively by General Electric and SNECMA. This decision should in time result in an order whose size is estimated at 1,500 engines. This assures a work load up to the end of the present decade (see L'USINE NOUVELLE, No 5, 31 January 1980).

The "Honor Roll" of Dassault Aircraft

Aircraft Designation	Number Sold	Number of Customer Countries
Mirage III, 50, and 5	1,386	21
Mirage F1	614	10
Alpha Jet	486	8
Falcon 10	194	18
Falcon 20	459	45
Falcon 50	117	5

On the military manufacturing side SNECMA is sure that its orders for Atar engines, that is, those which are equipping the Mirage 50 and F1, will run into 1982. As for the M 53 engine intended for the Mirage 2000 and Mirage 4000, the first deliveries are expected this year. Last, the market for the Alpha Jet, which is equipped with a Larzac engine built cooperatively by TURBOMECA and SNECMA and the German MTU and KHD firms, today is reflected in an order for 1,000 engines. Other good news: the revival of its Transall has, since October 1977, provided SNECMA, within the European Consortium

(SNECMA, MTU, Rolls Royce, and Fabrique Nationale of Herstal, Belgium) an outlet upon which it had not counted.

The second promising SNECMA actively involves engines for civil aviation. More difficult, for here the customer is not a single aircraft builder, or nearly so, like AMD-BA, but the international market. Nevertheless, with the CF6 60 engine, developed by General Electric and which is the subject of a licensing Agreement since March 1971, SNECMA is participating (with a 27-percent share) in building engines for the A 300 Airbus. Today the production rate is about nine engines per month. It will increase to 10 in 1981-1982.

In view of the success with which the European aircraft is meeting, SNECMA already is contemplating increasing the production rate to 13 or 15 per month... which is several hundred thousand hours of additional work for itself and its subcontractors, who number about 4,000 including suppliers and equipment manufacturers.

Be Not Unprepared, Would-be Subcontractors

These "live sources" are not all active. But SNECMA is reactivating them whenever the extra work load cannot be absorbed by its own plants. The trend is the same at TURBOMECA, the engine manufacturer in the Pyrenees (plants at Bordes and Tarnos] when the production rate for helicopter engines (the French firm's specialty) is experiencing the same increase as the sales of AEROSPATIALE helicopters. Thus, up to the present more than 13+ of the malika, TURBOMECA's newest creation, have been ordered. From seven engines produced in 1979 the output is going to increase to 70 in 1980. Then 100 in 1981 and finally 150 in 1982.

The temptation to call upon subcontractors other than those traditionally used by SNECMA and TURBOMECA has not failed to germinate in the minds of the public authorities. Thus, as has already been done in the case of other aeronautics companies SNECMA has been urged to make contact with companies experiencing difficulties, such as the Chantiers de l'Atlantique at Nantes, or Alsthom-Atlantique at Belfort. Results are not very conclusive. Only Alsthom-Atlantique is of some interest, considering its experience in gas turbines. Indeed it is going to make discs for aircraft engines.

But be not unprepared, would-be subcontractors! For a good number of enterprises, even though they do not today posses the necessary know-how and machinery, it will not be sooner than 1982 that they can hope to work for the Aeronautics industry. "It will in fact take at least 2 years to be equipped and attain aeronautical quality," explains an aircraft builder. Only a few specific companies can still hope to enter the opening in the aeronautics field. "We were contacted at the beginning of last summer, specifically by SNECMA, to supply thousands and thousands of screw-machined parts for assembling engine pairings," explains Marie-Louise Bauden, president-director general of the Inox Company of Sallauches. An exception which proves the rule....

Equipment Makers: Big Efforts Still to Be Made

Until 1982, no hope for new subcontractors. But beyond the field is open. If France "is again stepping on the gas in aeronautics," it is in fact a vast market which should be open to all the manufacturers working for the sector. (See the boxed "Business Statistics).

The first ones to worry about a slowdown are the equipment makers. More than anywhere else it is perhaps in this sector that big efforts still have to be committed: "I am not in the habit of crying 'wolf' but I say that the effort at present being made by the aeronautics industry in general is half of what it should be," Pierre Dupre, president-director general of SFENA (French Air Navigation Equipment Compan) told L'USINE NOUVELLE. Let us remember that AEROSPATIALE has just announced that it was ready, this year, to invest 400 million francs, compared with 278 million in 1979 and 45 million in 1978. These figures compare with the 400 million deutschmark which the German MBB [Messerschmitt-Bolkon-Blohm] firm states it is willing to invest between 1980 and 1984 and the 300 million pounds which British Aerospace intends to spend up to 1984!

For the equipment manufacturers alone there are two other factors which intensify their anxiety: on the one hand, the decline of the dollar which, they declare, results in a dead loss of 14 percent in relation to what they could realize from their work if they were paid in French francs; and, on the other hand, the dizzying decline in the prices of equipment caused by use of electronics. "The advent of electronics into our equipment results in a lowering of our cost prices by a factor of four!" says a French manufacturer.

The only means to maintain employment: diversification. SFENA, for example, is in the field of data processing terminals and contemplates other openings close to aeronautics.... In the end there is a more serious threat: "How can we be sure of remaining independent and competitive tomorrow when the new electronic components which we must use are all manufactured in the United States?" Dupre wonders. This anxiety is exacerbated by the spirit, with fanfare, of the Airbus. "Now, when Airbus is taking off, is the very moment when the roof is falling down upon us," a manufacturer of aircraft equipment points out.

Entering the Civil Field

The Airbus is the occasion for all the French manufacturers who up to now have worked mainly on military aircraft to see (finally) their products aboard a civil airplane. After the failures of the Concorde and Mercure, their thirst for a comeback is great! Second in the world in this specialty, the French aeronautical equipment industry is said even to have surpassed the British.

In total the French are said to occupy a number of favorable positions: such is the case with digital autopilots for commercial aircraft (SFENA). Thomson-CSF in the area of cathode ray tube instrumentation is well situated

vis-a-vis the Americans. Niessier-Hispano-Bugatti has no equal for landing gear, TRT for radio altimeters, and SARMA, a subsidiary of SKF, for structural trusses and control rods, as well as table tension regulators, bearings, ball joints, etc.

In fact, numerous French manufacturers have been selected by the American aircraft constructors for the Boeing 757 and 767. But even if the order books are satisfactory for a majority of the equipment manufacturers and assure a work load for the next 2 or 3 years, beyond that things become uncertain. The public authorities are aware of this and for several years have been trying to restructure the equipment industry.

The idea, in outline, is to form a new company capable of producing complete systems (piloting, control, surveillance, detection, weapons systems, etc.) for aviation. A kind of "second" Thompson-CSF would thus be created. SFENA (a company in which the government has an interest) is being asked to play the role of "federator." Crouzet, SFIM, and SAGEM have been invited several times to cooperate with SFENA. Now only a SFENA-Crouzet combination appears capable of resulting.

"The problem is complex," explains Pierre Dupre, president-general director of SFENA. "It is a matter of uniting a state company with one whose stock is quoted on the Bourse. This cannot be effected without referring the matter to the Parliament and Council of State."

If the first step is to merge SFENA and Crouzet, the second is to combine with them, later, the electronics subsidiary of AEROSPATIALE, namely EAS, and then, in the end, SFIM and SAGEM. "I shall strive to the utmost," Dupre continues, "before leaving SFENA this year as planned, to put everything into place so that this result may be realized."

Weaknesses at the Technological Level

As can be seen such a regrouping cannot fail to change the industrial picture of this sector profoundly...and first and foremost, that of electronic subcontracting. "Today there is rather little electronic subcontract work coming from the aeronautic industry. Only wiring is significant, although it involves only orders fulfilled for the Airbus," a subcontractor in Toulouse remarked. In the areas of aircraft and military missiles Dassault and Matra are the two large principals. Some even go so far as to state that without Dassault (and IBM) electronic subcontracting would never have seen the light of day in France!

To sum up: "Aeronautics should not provide many hours of electronic subcontract work in the next 5 years," in the opinion of Jean Rouviere, the prime mover of Asef-PMI.

But even though there is anxiety that must be expressed, he believes it exists at the technological level. "The new aircraft that are going to come off the line in the next 3 years are going to be equipped with digital electronics.

This is the case with the Airbus and with Dassault's aircraft. Subcontractors must henceforth be aware of this. Otherwise there is the risk of seeing a repetition of the crisis which seriously shook the subcontractors working in the telephone industry when, in 1976-1977, it abruptly passed from electro-mechanical to electronic."

The civil sector presumably is being called upon to grow faster than the military. It must be remembered that the military sector is experiencing some delay at the level of engines (especially the M53) as well as at that of on-board equipment. For electronic subcontractors, as well as mechanical, metal working, etc, it is indeed important not to stake everything on a single branch of aeronautics.

New Machinery to Meet New Production Needs

In this regard numerous subcontractors have just decided (at last) to buy new machinery in order to be better capable of meeting increased production rates, particularly of the Airbus. Such is the case with Cegedur, at Issoire (Pechiney Group) which is thus going to double (35,000 to 40,000 tons per year) its production of high strength aluminum alloy sheet, and also with Forgeal, also at Issoire (and like Cegedur, a subsidiary of Pechiney). "Sixty-five percent of our business comes from aeronautics; we are indeed expanding rapidly," Jean Tigeot, president-director general of Forgeal confirms. To meet the demand Forgeal is going to install a new 10,000-ton press between the 7,000-ton and 20,000-ton presses now in use. The staff (440 employees) is also going to be increased this year. The Issoire plant of Forgeal is running well. It makes wing longerons for the Airbus, parts, helicopter rotors, landing gear wheels, etc.

South of Toulouse, at Pamiers, Creusot-Loire is also booming. This is the very model of enterprise (1,250 employees) working for the Aeronautics industry, in which great effort is devoted to quality and inspection of the steels produced and fabricated. The result: aeronautics business has increased from 20 percent to 35 percent of the total. The reasons for the boom: the Airbus and sales in the United States to General Electric and Pratt and Whitney, which has led to new equipment. A fourth press will supplement the other three of 20,000, 3,000, and 1,000 tons. Director Saum of the Paniers unit of Creusot-Loire is nevertheless uneasy. "Here we are already responsible for fabricating Airbus components at the rate of six per month. To go to 10 between now and 1982-1983 will not be easy. As for increasing to 15 per month, that is going to pose cursed problems!" For two reasons: the capacity of the 10,000-ton forges is inadequate and a shortage of light alloys is feared...

Aeronautics subcontracting is not the prerogative of only very large companies. Especially in the mechanical field. Thus, at Pontoise, Carpriaux, which employs fewer than 50 persons, equipped itself with numerically controlled machines 10 years ago. The latest (which is the ninth) has just been delivered. "Today we are told 'invest, invest!' But why would you expect

us to go into debt if at the same time we are not promised orders?" Jean Carpriaux asks with surprise. "Here we are buying the machines which suit us in the first place and which may later be adapted to our manufacturing." This strategy must be a good one. Carpreaux is garnering orders and is constantly cramped for space.

The same remarks are heard at SAFOM, in Toulouse, where Mme Seguin and her son are wondering about the actual intentions of the local AEROSPATIALE plant, which has decided to transfer certain activities to the Les Mureaux plant that is experiencing difficulties, thus at the same stroke cutting off numerous efforts and investments. Fortunately for SAFOM it also works for Dassault.... Several kilometers away, Quetelot, a fine sheet metalworking enterprise (99 employees; 15 million francs business volume) shares this skepticism: "At present I refuse to invest despite regional pressures because there is not a single contract in hand."

Tackling Foreign Markets

"On the other hand, I will invest only if I feel an internal need" declares Rene Sartulaire, chairman of the Quetelot board of directors. But he is not one to throw up his hands. "Our strategy is simple. We work for practically all the aeronautics plants in France and what is more, we have parts in almost all aircraft programs, be they military or civil." However, that is not enough. So now Quetelot is tackling the foreign market.

Is Quetelot a case apart? No. Then can the capability of the French aeronautics industry to meet the challenge before it be doubted? So long as there are the Quetelot, SAFOM, and Carpriaux types there is room for every hope!

A Second Assembly Line at "Airbus City"?

At Toulouse-Blagnec, in the immense assembly bay of AEROSPATIALE, a brand new Airbus comes off the line every 12 or 13 days. At present the rate is nearly three airplanes per month. It will gradually be increased to four, and then six in 1982, finally to reach eight, indeed 10, in 1984-1985.

"There is no need to set up a second assembly line alongside the existing one," Airbus Industrie asserts. At the most a second bay is going to be built nearby to receive the first units of the Airbus A 310 (the 200-seat small Airbus) in order to commence mass production of it next in the main bay. Actually the second bay will never be an assembly line. It is simply going to be at the extremity of the first bay's line to give it more room. Not to duplicate it. Because the Airbus assembly line is the only one of its kind in the world. With 250 employees, assembled there are not only airplanes, but airplane subassemblies, whose parts are made at Hamburt (rear section, vertical rudder), Nantes and Sai t-Nazaire (nose section), Chester, England (wings), Bremme, Holland (forward section), and Spain (horizontal rudders).

By virtue of this system only 3 percent of the total work necessary to build an airplane is effected at Beagnac, compared with 18 percent in conventional

assembly lines. But, on the other hand, it is necessary to transport very large aircraft parts from these various places to Glagnac. Two special Super Guppy airplanes provide this service. To meet the increasing production rate Airbus Industrie has decided to provide itself with two new Super Guppy airplanes, whose construction has just been awarded to UTA Industrie.

Last, besides duplicating stations and hiring new employees, Airbus Industrie also contemplates constructing a second paint shop. The present building at Blagnac enables no more than one airplane to be painted in 5 days. This is inadequate to permit "decoration" of six to eight Airbus aircraft per month. Where will the second shop be built? No decision has been reached but neither Germany nor Great Britain are out of consideration.

In spite of everything the AEROSPATIALE engineers are uneasy. A second Airbus line would have been a better decision. "How can the production rate be doubled, indeed tripled, when it is impossible to put two or three men, considering the lack of room in the places where they must work?" they wonder.

Aware of this problem the Germans did not have to be told twice; they are ready to install a second Airbus line in Germany, especially for the A 310. But at Toulouse, at Airbus Indsutrie they are turning a deaf ear....

Things Are Better for the Press at Issoire

The big Soviet-manufactured press at Issoire is smiling again, or more precisely it is Interforge, the group responsible for its industrial expectation and which comprises Creusot-Loire (40.5 percent), Forgeal, subsidiary of Pechiney (40.5 percent), Aubert et Duval (13 percent), and SNECMA (6 percent). Since last October the forging press has in fact been working two shifts instead of only one. Proof that the work load has greatly increased.

"This increase is in part due to two factors," explains Jean Tigeot, director general of Interforge. "First, because of aeronautics which now is experiencing a recovery in activity, and also because our partner, Forgeal, is subcontracting to us a part of the work it cannot perform as long as its production capacity is fully occupied. "There is also a third reason: Interforge was initiated, it will be recalled, in January 1977 by the president of France. That was 3 years ago. That is precisely the time it takes to be able to commence production of parts upon such a machine. Thus, the parts solicited in 1976-1977 are now arriving on the production line.

The large press at Issoire is the most powerful in the western world--65,000 tons. To house such a mastodon Interforeg had to construct a commensurate building: equivalent to eight stories above the ground and four below! The forging press is in fact 36 meters high (including 11 meters underground) and its weight is twice that of the Eiffel Tower (12,000 tons)....

The press is now working for a goodly number of sectors. Civil and military aeronautics are in the forefront: "We are making the Airbus landing gear

in a single press pass. That is very spectacular and above all much more economical. Soon we are going to begin making parts for the A 310 small Airbus," Tigeot adds. Besides aeronautics (which accounts for 50 percent of the work) the press at Issoire is making numerous other parts (discs, crankshafts, etc) for gas turbines and Diesel engines for shipbuilding and parts for armament and military aircraft.

"Three years after its initiation Interforge employs 85 persons and is working at more than 50 percent of its theoretical capacity," Tigeot declares. At Issoire it is hoped to obtain orders abroad. Especially from the United States. "The Americans are very much interested in our machine. All the more so as they have only two 45,000-ton presses and not a one of greater capacity," says the director general of Interforge.

Subcontractors Hesitate

Unquestionably it is among subcontractors that the greatest reluctance to make thorough commitments to the aeronautics venture is to be found. And, it seems, they have good reasons to be swept up by the enthusiasm. Even though past disappointments are pushing some to extreme prudence (as was displayed in the depression of the black years for aeronautics; some have indeed sworn that they would not again be led to risk the survival of their firms in so cyclical a market), the lack of information concerning the actual extent of the market is inciting others to a wait-and-see attitude. They have no doubt taken notice of the victory communiques of the Airbus and CFM 56 but see no orders coming from the principals. Why, under such conditions, take the risk of investing in expensive machinery? Not to mention that they are finding hardly any support on the part of financial organizations. What then? Is subcontracting going to miss the aeronautics boat? Such a danger has not failed to disturb the authorities, in particular, those who are counting upon the development of the grand civil programs to develop and strengthen the industrial fabric. Thus the first task for Michel Lemaire, charge de mission at DATAR [Delegation for Territorial Development and Regional Action], responsible for supervision of the grand Southwest Plan, was to determine the prospects that could be expected from those grand programs. After investigation he now exhibits comparative optimism. For three reasons:

For one thing, there has not yet been delay even though there is no longer any time to lose. In fact it is only in the next 2 years that the present programs are going to have an impact upon the industrial fabric. "We shall not see the great wave of orders that some have predicted. So much the better. The programs are going to create a very large volume of business, but gradually, which gives the subcontractors time to get organized," in Temaire's opinion.

For another, a change on the part of principals is seen. The most far advanced is unquestionably SNECMA. It is preparing its subcontracts program for the CFM 56 and has agreed to commit itself to long term contracts with subcontractors with a ceiling of 3,000 hours per year for each subcontractor.

With one reservation: the subcontractor must not be too small. As for SNIAS, since the end of last year there has been observed a change in this sense: "It should agree to similar arrangements," Temaire points out. It remains for it to put its good intentions into concrete form, however.

Last, even the obstacle of financing should be on the verge of being removed. One solution would be participative loans (at low interest rates) granted by CIDISE (Interministerial Commission for Development of Investments and Maintenance of Employment). "The condition is that the subcontractors prepare themselves," Lemaire specifies. That, moreover, is what is in progress in the Grand Southwest, with different methods, depending upon the region. At the CRCI of Toulouse-Midi-Pyrenees the final touches are being put on the organization of an equipment leasing company. At Bordeaux 23 subcontractors have decided to form an aeronautics group. And in the Adour Basin, the iniative comes from some subcontractors, already well organized, who are serving as the driving force for the other enterprises. A first participative loan is on the point of being accorded to one of the leaders. "Everything can proceed very quickly if subcontractors are prepared," Lemaire emphasized, "for the industry as well as the Treasury have indeed decided not to let the paper work drag."

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STRUCTURE OF DATA PROCESSING COMMUNITY OUTLINED

Paris AFP SCIENCES in French 31 Jan 80 p 13

[Text] Paris--The functions of the Ministry of Industry in the data processing sector are now being carried out through four principal organizations, it was indicated by Mr Jean-Claude Pelissolo, manager of DIELI [Electronic and Data Processing Industries] in a press conference on 28 January.

Mr Pelissolo discussed DIELI, the data processing mission and the two new institutions spun off by the splitting of the IRIA [Institute for Research in Data Processing and Automation]: the INRA [National Institute for Research in Data Processing and Automation] and the Data Processing Agency.

Basing their justification on the nationwide data automation plan launched in December 1978, Mr Pelissolo explained the respective missions of the two new organizations. The INRIA will undertake basic and applied research, conduct experimental work combining on a nationwide scale the laboratory resources of public and private organizations, organize international scientific exchanges, and mobilize knowledge and know-how throughout the entire nation.

The Institute (350 persons) will be gradually decentralized to Rennes and Sophia Antipolis; the Paris headquarters will retain only some 100 persons.

The Data Processing Agency (60 persons) will be responsible for the advertising and promotion of data processing applications in all sectors of national life, except government administrations.

The 12-month gestation period that preceded the birth of these two new organizations facilitated the resolution of a number of difficulties, particularly in regard to the merging of the IRIA and the ADI [Data Processing Agency]. Mr Pelissolo emphasized that the two institutions will maintain a "close relationship" with each other and with the other administrations (of the Secretariat of State for PTT) concerned with the development of data processing and teleprocessing (DAILI [expansion unknown], DGT [General Office of Telecommunications], CNET [National Center for Telecommunications Studies]).

The DIELI is responsible for industrial applications. It will administer the 2.25 billion franc 5-year funding plan adopted last year for the automation of data processing, which comes under the DIELI, to an interministerial consulting role on the use of data processing in government administrations [this passage as published].

For 1980, Mr Pelissolo concluded, an overall budget of 480 million francs outside of research has been approved under the 5-year plan for automating data processing throughout all sectors of national life. Most of these credits pertain to the industrial sector.

9399
CSO: 3102

BRIEFS

TRAVELLING-WAVE TUBES FOR INTELSAT--Thomson-CSF has delivered to the prime contractor Ford Aerospace and Communications Corp the latest flight model of the 11-GHz travelling-wave tube (TOP) for use in the first series of the Intelsat V telecommunications satellites. Under terms of the contract of September 1976, 82 flight models of the TH 3559 tube have been delivered. All of the 11-GHz/10-w tubes for Intelsat V are being supplied by Thomson-CSF. Intelsat V is the first international commercial telecommunications satellite program to use European tubes. Thomson-CSF has also produced 20-w tubes for transponders of satellites of the Hermes CTS and OTS programs. The future European telecommunications satellite ECS will also use Thomson-CSF's space TOPs. Along with the models ranging from 10 to 20 w and 11 to 12 GHz, Thomson-CSF is now developing a number of TOPs of from 100 to 230 w for television satellites operating on the 12-GHz band. [Text] Paris INDUSTRIES & TECHNIQUES in French 20 Feb 80 p 94] 5364

CSO: 3102

NEED FOR CONTACT BETWEEN UNIVERSITY RESEARCH, INDUSTRY

Stockholm DAGENS NYHETER in Swedish 16 Feb 80 p 2

[Article by Hans G. Bohman]

[Text] In most Western countries, as well as in China and Japan, coordination between industrial development and scientific university research is encouraged. There are divided opinions as to how this can be done. Some researchers believe that scientific knowledge is valuable in and of itself and that industry sooner or later benefits from the spin-off effects of good research. Most politicians and many industrial leaders believe in and strive for close contact, or even joint cooperation between industry and university research.

The formula for such cooperation and the choice of research areas provide the cornerstone for a so-called research policy. Depending upon conditions concerning know-how and raw materials, different countries prioritize different areas. Despite varying starting points, there is agreement in the East as well as in the West that all will expand research in the area of biotechnology and that it promises to be very profitable.

Since the middle of the sixties, governments as well as parties in Sweden have all failed to come up with a comprehensive research policy until last summer. At that time the Social Democrats were the first to propose a research policy as part of its election campaign program. The proposal was broad, aimed at a general discussion of educational policy, student aid measures and better organized research efforts.

The proposal was vague with respect to new areas of research, but it suggested the creation of developmental companies in the technological areas of energy, environment, transportation, medicine and education. Under the heading "national project," they suggested still another area, namely biotechnology, arguing that this area of technology has "wide application" in the food industry, medicine, agriculture and in the waste treatment industry.

Based on this comprehensive list, we had hoped to be told what biotechnology is, but have not has as much as a hint. Succeeding arguments have instead been marked by wordiness, so characteristic of unsolved political compromises.

Political Cowardice

The explanation is just as simple as it is discouraging: the proponents of the program discussed hybrid DNA technology and its breakthrough, but fearing that the Center Party would start another nuclear energy debate during the election campaign, they chose not to even mention DNA. The same political cowardice characterized Parliament's handling of they hybrid DNA legislation last fall.

The result is, beginning 1 January, that all hybrid DNA research will be controlled by an 18-man delegation and three central government departments. Municipalities also have veto rights.

According to "usually well-informed sources," both Moderates and Social Democrats rely on detailed documentation which now shows that hybrid DNA research with the so-called coli K 12 bacterium is less dangerous than regular microbiological work.

In spite of the fact that these parties were to form a majority, block politics and cowardice allowed the Center Party and the Liberal Party to force the extensive bureaucracy that will now check all hybrid DNA work. They also forced a moratorium, which prevents the state-owned Kabi-Gen from manufacturing a human growth hormone (HGH), using a hybrid DNA bacterium, which the company was permitted to do last summer in a so-called P3 laboratory, according to rules then in force.

Investments

Against this background, there is reason to compare developments internationally as reported in SCIENCE 9, November 1979. Here we find that hybrid DNA technology has already led to extensive industrial developments, which today are valued at 1 billion or more Swedish kronor.

It started with four small companies, partly owned by researchers who started the undertaking based on their own know-how. Various large companies later invested in these developmental enterprises and, in less than 4 years, Genentech, for example, is worth 65 times its original value. The reasons are obvious: the company contracted to develop various hybrid DNA--carrying bacteria used in insulin and HGH; both are human hormones with a large potential market. Work on the insulin was ordered by Eli Lilly, the American drug giant, the HGH bacterium by the Swedish Kabi-Gen.

Other drug industries like Pfizer and Hoffman-La Roche also have invested heavily in hybrid DNA technology. International Nickel Company (Inco), a

multinational company with headquarters in Toronto, was among the pioneers. Other large companies that followed include General Electric, Dupont, Standard Oil of Indiana, National Distillers and Searle.

A few years ago there was fierce debate in the United States about the eventual risks connected with hybrid DNA technology. However, during 1978-79 a number of reports were publicized which definitely showed that hybrid DNA technology was less dangerous than the equivalent microbiological technology without hybrid DNA. As a result, US health authorities recently lowered its safety standards.

The Kabi Project

Work on the Kabi project, which required a special P3 laboratory last summer, should now move ahead according to P1 standards, i.e. in a regular microbiological laboratory. The maximum volume has been raised from 10 to 750 liters. Accordingly, the article in SCIENCE does not say anything about safety risks, but instead fully discusses the complicated patient situation.

Why is it that developments differ so much in the United States and in Sweden? Why do we have an industrial moratorium on hybrid DNA technology while the United States has invested 1 billion kronor? I believe it is partly due to the differences between a large and a small country and partly due to the difference in flexibility of industry in the two countries. Furthermore, we have had an unprecedentedly poor debate on the issue among politicians and in the mass media, but that is not the thesis I want to pursue here.

On the contrary, I want to point out that in a large country like the United States university research and industry usually work together. Therefore, whenever there is a breakthrough on the research front, there are always companies that perceive future developments and are willing to risk capital. Consequently, there is a relatively rapid commercial exploitation of basic university research and, as far as the medical industry is concerned, the principal deterrent is the extensive clinical testing required by the federal authorities.

Mismatch

In a small country like Sweden there is no coordination within the university sector or within industry. Instead, the situation here is characterized by peaks and large, empty voids. What is especially important is that university research and industry often have different profiles. This mismatch is the fundamental problem with this small country's research policy and this should, indeed, be noted by researchers as well as politicians.

When Erlander appointed the first Research Board (FB) at the end of the fifties after some deliberations at Harpsund, it was basically intended to provide politicians with advance information about where research would lead

society and industry. The idea was to establish a contact organization that would shorten the time period between innovations and their application and inform the public of new technological breakthroughs to prevent surprises.

This excellent idea gradually lost ground under Palme's leadership, particularly due to the anti-intellectualism that followed the students revolts. The final blow came in 1978-79 when Jan-Erik Wikstrom, instead of engaging young researchers to work on future projects, "renewed" the board with sex quotas, humanism and jurisprudence.

In its present form, FB is completely out of touch with industry and the average age of 54-55 is well above maximum with respect to creativity. Hence, I doubt the present board's ability to augur future innovations of importance to society and industry.

If the government wishes to retain FB as a super faculty or cultural committee, that is its business. However, if it wants to pursue an active research policy which could also facilitate the renewal of our industry, it must quickly establish a contact organization capable of reducing the consequences of an inherent mismatch between research and industry in this country.

On the other hand, we must remember that the 1974 research board held extensive hearings in connection with hybrid DNA technology, sessions at which then chairman Olof Palme failed to appear. The Palme government also ordered all documentary materials placed in the archives. Therefore, the establishment of a new contact organization must not only include the right choice of persons, but there must also be a determined desire on the part of politicians to preserve the information provided by researchers, otherwise the efforts are wasted. Would it not make sense to consider this proposal while billions of kronor are being wasted in the shipbuilding industry?

8952
CSO: 3102

SAAB PRESENTS UNIQUE 'KNOCK-FREE' ENGINE

Stockholm SVENSKA DAGBLADET in Swedish 15 Feb 80 p 4

[Reportage by Anders Hultman]

> [Text] An engine that "thinks" and runs on 91 or 99 octane leadfree gasoline or gasohol--without knocking and without having to be adjusted, has good acceleration and uses eight percent less fuel!

There is such an engine. It will be available in all Saab 900 Turbo models.

This unique engine was shown for the first time last Thursday in Stockholm by Sten Wennlo, the head of Saab passenger car division. This model was mounted on a rolling test bench, a Saab 99 Turbo--but within a short time some 50 Saab 900 Turbos, equipped with the new APC system, will be tested in the United States and Sweden, among other countries, by an equal number of "average" drivers.

It Never "Knocks"

APC stands for Automatic Performance Control and is technically an improved regulating system (ignition control), which is already in use on some American automobiles. The system senses when the engine is about to knock and automatically retards the spark setting. This is what happens in a conventional engine when you retard the spark setting in order to use lower octane gasoline--but also using more gasoline!

The Saab system not only senses knocks, but also has a "brain"--an electronic package and a magnetic valve. The "brain" is also hooked up to a pressure sensor in the engine's vaccum line--and together these devices react in 1/9 of a second and regulate the engine's fuel pressure several times a second, without the driver being aware of it.

Tested With 93 Octane

In practice it is impossible for the average driver to get the engine to

knock! I tried it, starting at 20 Km an hour in high gear and pushing the gas pedal to the floor; the engine gained highway speed (hesitatingly in the beginning, of course) without my hearing the slightest amount of engine knock or observing any change in other instruments, using 92 octane gasoline.

Saab Turbo is an exceptional automobile; it has a 145 horsepower engine, 200 horsepower at top speed, and a price of over 70,000 kronor for the 900 version.

Saab 900 Turbo with the APC system will, of course, be an even more exceptional automobile, actually too good for roads and speed limits in Sweden. [The fact that Saab expects to sell more than half of its Turbo production in the United States, with its strict speed limits, must be viewed as a manifestation of Americans'playful temperament).

What promises to be most interesting is the possible adaptation of the APC system to the regular vacuum engine (above all that the engine will adapt itself to whatever fuel is in the tank--the maximal utilization of energy).

Will Take Over a Year

"We are pondering how this can be done," said Sten Wennlo. It should take approximately 18 months to manufacture a test car.

For the time being it looks like Saab will continue to profit greatly from its advanced Turbo technology, now augmented by APC.

And, already, there are profits, That will become known today, Friday, when Saab publicizes its annual report. Record profits! Even passenger cars are beginning to yield profits.

8952
CSO: 3102

BRIEFS

ROLLS-ROYCE, JAPAN DEVELOP ENGINE--Rolls-Royce and three Japanese firms have agreed in Tokyo to codevelop a jet engine for civilian purposes. The Japanese firms are Ishikawajima-Harima Heavy Industries, Kawasaki Hl and Mitsubishi Hl. The engine will have a thrust of about 8,600 kp and be ready for delivery by 1986. The new engine would be suitable for airplanes having a capacity of up to 150 seats. Preliminary studies by Rolls-Royce are available with the study number RB432. Development and subsequent production have been divided on a 50:50 basis between Rolls-Royce and the Japanese consortium. [Text] [Gelsenkirchen AEROKURIER in German Feb 80 p 115] 9527

CAA APPROVES ROLLS-ROYCE'S GEM--In mid-December the British Civil Aviation Authority issued its approval for the Rolls-Royce GEM helicopter turbine, which will be offered in two versions with 900 and 1,120 WPS respectively and which will be used in the Westland Lynx. With this the possibilities for selling this tested engine, which should be offered as of 1984 in versions supplying up to 1,300 WPS, for civilian purposes appear to be good both in Europe as well as in the USA. Up to now, 540 GEM engines have been built with a cumulative operating time of 70,000 hours. [Text] [Gelsenkirchen AEROKURIER in German Feb 80 p 115] 9527

BRITISH AEROSPACE'S RECORD YEAR--Business in the civilian sector last year ended in a new record for British Aerospace. Above all, sales for the HS 125-700 shot up. In all 55 of these business jets were sold last year. This exceeded by 10 percent the previous record of 50 sales in 1968. Even the sales successes in the Airbus Industry for British Aerospace (production of the supporting surfaces) turned out to be extremely positive. With a total of 132 solid sales, last year the Airbus achieved a level of 40 percent of the market in airplane equipment sales. Evan the HS 748 continued to sell last year. With the first sales of the HS 748-2B the number of the planes ordered of this type increased to 345. The licensing agreement with Romania was signed for the BAC One Eleven. This involves the shifting of the production site for 22 planes to Romania on a step-by-step basis. From 1985 onwards the One Eleven will only be produced in Romania. Despite an extensive campaign for the BAC 146, no sales of this plane could be reported. But there is still a great deal of confidence placed in this program at British Aerospace, although the program was already interrupted once a few years ago. The virgin flight of the BAC 146 is planned for 1981. [Text] [Gelsenkirchen AEROKURIER in German Feb 80 p 118] 9527

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END

SELECTIVE LIST OF JPRS SERIAL REPORTS

WESTERN EUROPE SERIAL REPORTS

WEST EUROPE REPORT
WEST EUROPE REPORT: Science and Technology

WORLDWIDE SERIAL REPORTS

WORLDWIDE REPORT: Environmental Quality
WORLDWIDE REPORT: Epidemiology
WORLDWIDE REPORT: Law of the Sea
WORLDWIDE REPORT: Nuclear Development and Proliferation
WORLDWIDE REPORT: Telecommunications Policy, Research and Development

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